R E P O R T R E S U M E S

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MATH-SCIENCE INSTRUCTIONAL MATERIALS.

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INCLUDED ARE LISTS OF FILMS, FILMLOOPS, FILMSTRIPS, AND TRANSPARENCIES WHICH HAVE BEEN CATALOGUED BY THE EDUCATIONAL MEDIA CENTER, MONTEVIDEO, MINNESOTA. THE FILMS ARE CATALOGUED IN (1) A SUBJECT MATTER INDEX IN WHICH ALL FILMS ARE LISTED BY MAJOR CURRICULUM AREAS, (2) AN ALPHABETICAL INDEX, AND (3) A NUMERICAL LISTING WHICH PROVIDES A COMPLETE DESCRIPTION OF EACH FILM. INFORMATION INCLUDED ON EACH FILM AND FILMSTRIP IS (1) ITS LENGTH, (2) WHETHER IT IS COLOR OR B-W, AND (3) THE GRADE LEVEL(S) FOR WHICH IT IS SUITABLE. THE FILMLOOPS ARE LISTED NUMERICALLY ALONG WITH A BRIEF DESCRIPTION. ALSO LISTED ARE READY-MADE TRANSPARENCIES AND PACKETS OF ORIGINALS FOR MAKING TRANSPARENCIES. INFORMATION ON (1) THE USE OF THE AUDIOVISUAL INSTRUCTIONAL MATERIALS, (2) ORDERING PROCEDURES, AND (3) THE DISTRIBUTION OF THE MATERIALS IS PROVIDED. (DS)

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MATH-SCIENCE

INSTRUCTIONAL MATERIALS

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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INTRODUCTION:

All teachers are strongly encouraged to use motion picture films and other Audio-Visual instructional materials in the instructional program of their class. We know from research and experience that Audio-Visual materials when properly used:

1. develop clear understandings
2. promote more learning in less time
3. improve retention of things learned
4. make learning interesting
5. provide a common experience background
6. focus pupil attention on the subject
7. make objects and ideas more realistic
8. bring the world to the classroom

Our Media Center film library will make it possible for teachers to use films to their best advantage at the time they are studying any given topic.

It is intended that where ever possible, films contained in this catalog be used as learning tools in individual classrooms. Film should be used at the most opportune time, when a topic is being taught. Just because a film is in a building it should not be used by a number of other teachers in the building except in rare cases where more than one class is studying the same topic at the same time. Our aim is to provide the <u>right film</u> at the <u>right time</u> for use in the <u>right way</u>. Under this plan each teacher determines what material is needed and requests this film when it best fits into the classroom work.

FILM UTILIZATION:

The film is only as valuable as the teacher makes it. Experience has taught us that pupils do not necessarily learn merely by looking at film. To obtain maximum benefits from films the following items should be considered.

1. SELECTION: Be sure the film is carefully selected to reinforce or supplement what the class is studying.

2. PREVIEW: Know what the film contains before showing it to your class. Make notes on difficult points, terms, major concepts, etc. A complete set of teachers study guides for all Center owned films is available in the principal's office in each building. Use these regularly.

3. PRESENTATION: Before showing, point out to your students what they are to look for. List questions to be answered by the film. Relate the film to topics being studied. Make related assignments for follow-up activities.

4. FOLLOW-UP: Give pupils an opportunity for analysis interpretations and discussion. As a review activity, ask the students to summarize the film in a short paragraph. To check comprehension and attention give a brief quiz. Discuss related information and projects for additional study.

SUBJECT MATTER INDEX:

Check this index first to find the right film. In the subject matter index all films are listed by major curriculum areas. The grade level of the films has been determined by the Film producers and the University of Minnesota Film Service. Along with the title of each film there is a number and some letters. This number is used when ordering the desired material. The letters denote the suggested grade level at which the material should be used. The code for these letters is as follows:

P - Primary
G - Intermediate Grades
J - Junior High School
S - Senior High School
C - College
A - Adults

Often films can be used effectively at several grade levels. In that case more than one letter is used.

ALPHABETICAL INDEX:

This index gives a complete alphabetical listing of the Center owned films. Along with the alphabetical listing you will again find a number and a letter or letters.

FILM DESCRIPTION:

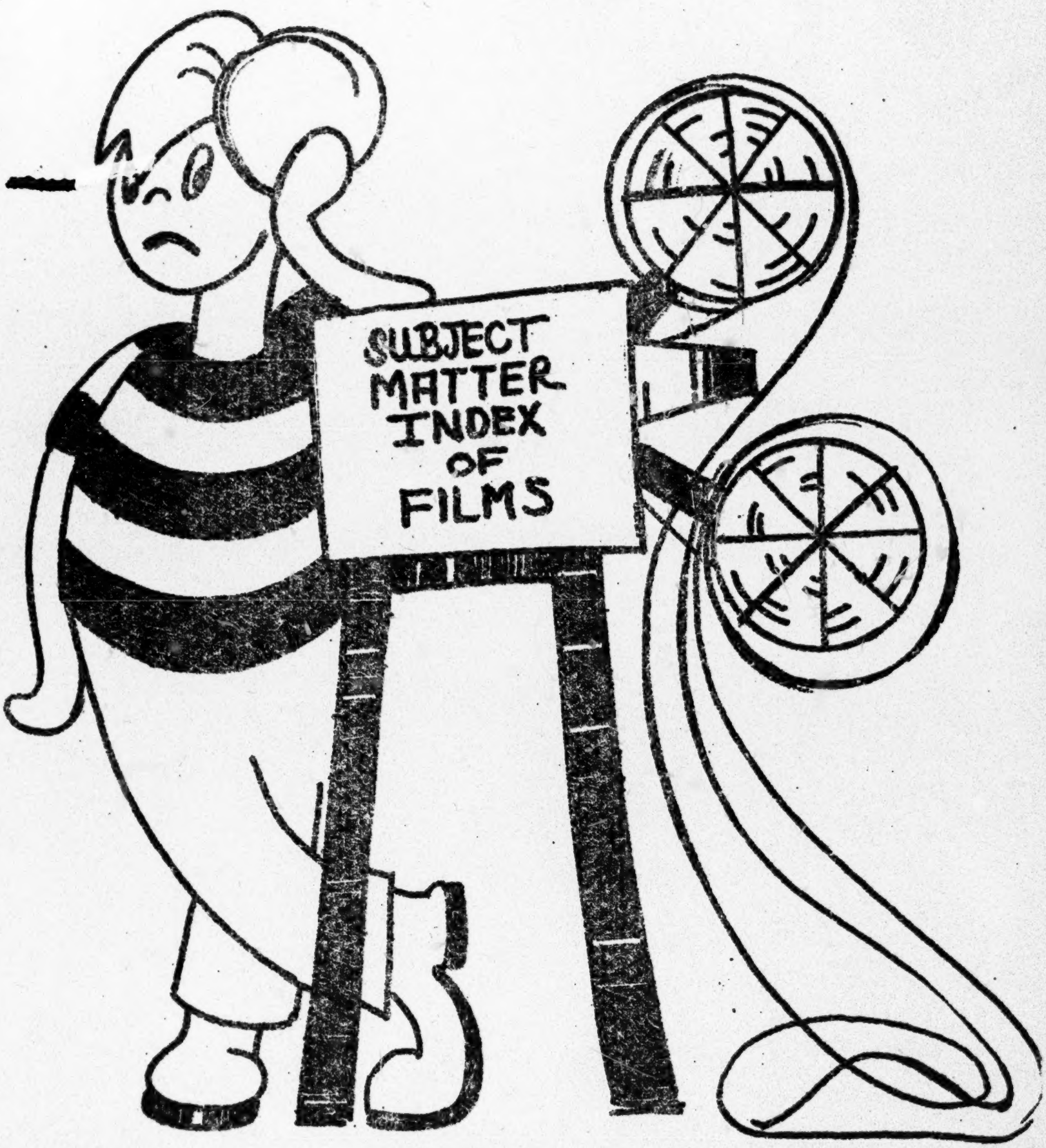
A complete description of each film which also states its length, whether it is color or B-W, etc. is provided numerically by title in this section of your film catalog. Check this section of the catalog often. If you have consulted the catalog section relating to the subject matter index - this procedure will help you to select the right film for the grade and unit you are teaching and the description section will give you a short summary of the film.

WHEN TO ORDER:

One of the major goals of the Audio-Visual Dept. is to make material available when they best fit all the needs of the class. These needs cannot be accurately determined months in advance. Long range material ordering should generally not be used. Whenever possible, teachers should not order films more than one month in advance of planned date of film use, and not less than one week prior to date of use.

DISTRIBUTION:

All materials are to be delivered and returned via the delivery van or mail. Films must be returned promptly in the shipping case they were received in.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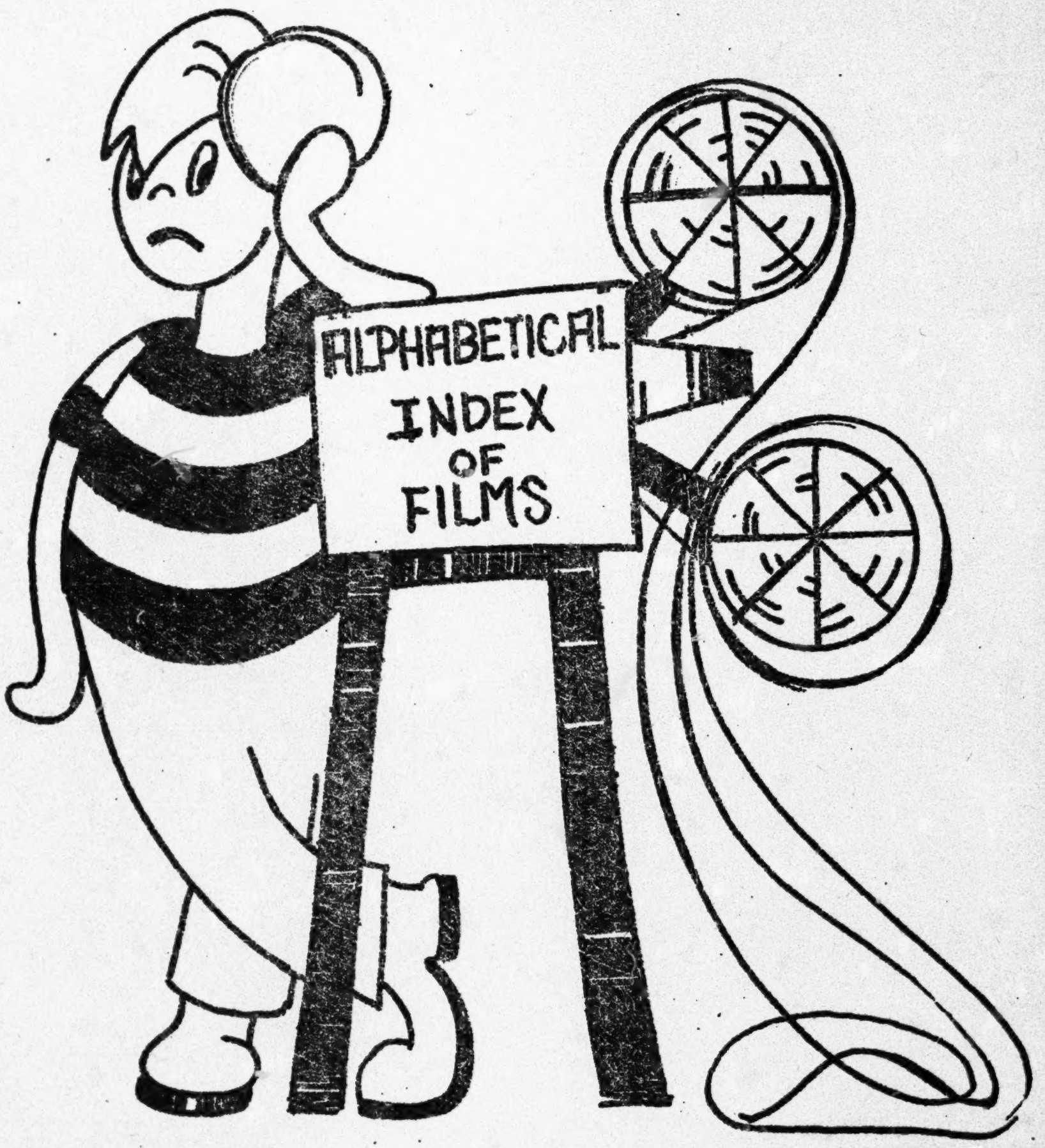
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Vibrations & Waves #4065 S.C.

Volume And Its Measurement #272 J.

W.

Wave Lengths of Spectrum Lines (Lab.) #4140 S.C.

Waves & Energy #118 .. J.

Waves On Water #2181 J.S.A.

Weather: Understanding Precipitation #326 J.

Weather: Understanding Storms #302 J.

Weather: Why It Changes #512 J.

Weighing The Air (Lab.) #4061 S.C.

What is A Bird? #2169 S.C.

What Is A Fish? #4233 S.C.

What Is A Mammal? #2174 S.C.

What Is An Amphibian? #2156 S.C.

What Is A Reptile? #2010 S.C.

What Is Ecology? #2139 S.C.

What Is Electric Current? #2239 J.

What Is Soil? #361 J.

What Is Space? #110 J.

What Is Uniform Motion? #2240 J.

What Makes Clouds? #2167 J.S.A.

What Makes The Wind Blow? #2161 J.S.A.

What Plants Need For Growth #2458 J.

Wheat Rust #2061 S.C.A.

Wheatstone Bridge (Lab.) #4124 S.C.

Why Do We Still Have Mountains? #4226 J.S.A.

Why Seasons Change #376 J.

Wildflowers Of The Field And Meadow #313 J.

Wind & Percussion Instruments #4087 S.C.

Work & Energy #4031 S.C.

X.

X-Rays #4141 S.C.

NUMERICAL
INDEX &
DESCRIPTION
OF
FILMS

NUMERICAL FILMS LISTING

JUNIOR & SENIOR HIGH

1. FUNDAMENTALS OF ACOUSTICS (2nd. Ed.) This film compares sound waves with water waves. Provides examples of echoes and explains how they affect acoustics indoors. Demonstrates effects of different wall surfaces upon the reflection of sounds. Portrays the mechanics of our hearing process and the range of the human voice. Reveals the effects of eliminating certain vibrational frequencies and identifies ultrasonics. B/W EBF J.S.

2. ANIMALS IN WINTER (1 reel) Describes various ways in which animals prepare their homes for the winter season, store food, and adapt themselves to the cold. Explains hibernation, changes in appearance of some animals as winter approaches, and that some animals live through winter in a different form. Shows a badger, woodchuck, chipmunk, caterpillar, owl, rabbit, bluejay, porcupine, bobcat, and fox in natural surroundings. B/W EBF J.

5. HONEYBEE, THE (1 reel) Illustrates the life cycle and habits of the honeybee, comparing the functions of the queen, the workers, and the drones. Shows the life cycle from egg laying through metamorphosis, gathering of nectar and pollen, manufacture of honey, cross-pollination of flowers, development and characteristics of the queen, swarming, and building the new comb. B/W EBF J.S.

12. FOREST GROWS, THE (1 reel) Presents the story of how our forests grow. Points out and describes the various elements that contribute to the mature forest, emphasizing the unique contribution of each element. Explains forest zones in relation to temperature and rainfall; and defines the phrase "the climax forest." Color EBF J.S.A.

19. OUR SOIL RESOURCES (Formation and Conservation) (1 reel) Explains graphically how soil is formed by the physical and chemical disintegration of rock and by the decomposition of plant and animal matter. Shows the world's four soil groups and defines the geographic limits of each in the United States. B/W EBF J.S.

24. NOSE, THE (Structure and Function) (1 reel) Making use of animation and microphotography, this film illustrates the physiology and the breathing and smelling functions of the nose. It explains the ingenious protective system of the breathing organs and shows the reasons for breakdowns in the nasal passages. Color EBF J.S.A.

27. LEARNING ABOUT LIGHT (1 reel) Illustrates the nature and properties of light. Demonstrates the reflection and refraction of light. Explains that objects are transparent, translucent, or opaque, and that some objects are luminous. Simple demonstrations and animated drawings are used to explain basic concepts of light and why they are important in everyday life. B/W EBF J.

35. ANIMALS IN SUMMER (1 reel) Shows familiar animals - insects, frogs, snakes, squirrels, foxes, and bears -- as they hunt for food and explore the woods. Reveals the natural adaptive coloring of animals-- a characteristic which affords protection from enemies. Also observes insects as they develop through their life cycles during the summer season. Color EBF J.

36. HUMAN BRAIN, THE (1 reel) Describes the brain and compares its development in several animals and in man. Differentiates the functions of the medulla and cerebellum, and describes the cerebrum in detail. Illustrates the cerebral functions of perception, motor control, analysis, integration, planning future acts, and elaborating responses as applied in a critical situation B/W EBF S.C.A.

37. OUR WEATHER (1 reel) Explains what causes weather, why it changes, how it is forecast, and how it affects our lives. Animated drawings and live photography are used to show the formation of air masses and the creation of weather "fronts." Illustrates the water cycle, major cloud types, and the formation of dew, frost, and snow. B/W EBF J.

43. LEARNING ABOUT ELECTRIC CURRENT (1 reel) Describes the characteristics, uses and dangers of electric current. Circuits, conductors, insulators, fuses, and switches are explained both in animation and in simple demonstrations, and the electricity used in the home is traced back to the generators in a power plant. B/W EBF J.

49. FOREST PRODUCES, THE (1 reel) Illustrates the development of forest resources and describes their importance and uses. Shows how timber is grown, explains the forest watershed's importance, and describes man's uses of forest lands for recreation. Discusses ways in which forest resources are threatened by man. Color EBF J.S.A.

51. LEARNING ABOUT YOUR NOSE (1 reel) Explains how the nose serves as a hallway between the changeable outside world and the sensitive breathing organs. Demonstrates the nose as a sterlizer, cleanser, air conditioner and humidifier, and suggests proper nasal health practices. Color EBF J.

55. PLANETS IN ORBIT - THE LAWS OF KEPLER (1 reel) This film traces a brief history of a man's earliest observations and beliefs about the universe and then goes on to show how Johaness Kepler made three discoveries that revolutionized astromomy. Explanation of Kepler's three laws is visualized in brilliantly animated sequences. B/W EBF J.S.A.

62. SAFETY WITH ELECTRICITY (1 reel) Demonstrates that electricity can be dangerous, shows how these dangers can be minimized by simple safety precautions, and illustrates some of the ways in which we use electricity. Simple experiments and demonstrations show the nature and sources of electricity and illustrate desirable practices with electrical equipment and appliances. Color EBF J.

70. PLANKTON: PASTURES OF THE OCEAN (1 reel) Photomicrography shows plankton -- the conglemeration ofplants and animals in the upper levels of the sea, which are the vast food sources for all marine life. Not only do youngsters come to recognize the diatoms and dinoflagellates which form the base of the food pyramid in the sea, but they also see the microscopic animals and larvae which feed on planktonic plants. Because of the huge population of larger animals which plankton supports, the film suggests the increasing importance it may hold for man. Color EBF J.S.

77. SPINAL COLUMN, THE (1 reel) Supplementing live action scenes with X-Ray and stop-motion photography, animated drawings, and graphic close-ups, this film provides a detailed study of the structure and functions of the spinal column. The five spinal regions are identified, the curvatures of the spine are described and the importance of good posture is stressed. B/W EBF J.S.C.A.

85. FIRST AID ON THE SPOT (Third Edition) (1 reel) Makes a vital contribution to all courses and programs on first aid instruction. Demonstrates approved first aid treatment as set forth in the revised edition of the American Red Cross First Aid Textbook. Film features six common types of injuries or disabilities and the American Red Cross technique for treating each, with demonstrations of caring for wounds, burns, and shock; of controlling bleeding; splinting a fracture; and administering artificial respiration by both approved methods. B/W EBF J.S.C.A.

88. ANIMALS OF THE INDIAN JUNGLE (1 reel) Explores the dense tropical rain forest of Eastern India, showing vivid closeups of representative animals in their native environment. Shows the pattern of survival in the jungle - the ways of the hunters and the defenses of the hunted. Includes sequences on the tiger, the python, the cobra, the mongoose, the monkey, and the elephant. Color EBF J.S.A.

89. STEAM ENGINE, THE: HOW IT WORKS (1 reel) Presents a detailed demonstration of the steam engine at work and explains the scientific principles involved in its operation. Traces the historical development of the steam engine -- from the first experiments performed in the second century B.C., to the "double-action" engine invented by James Watt. Describes the dramatic changes in American life -- especially in manufacturing and transportation -- resulting from the practical applications of steam power. B/W FBF J.

92. FUELS -- THEIR NATURE AND USE (Second Edition) (1 reel) Investigates the principle kinds of fuels used in homes and industry; traces the source of most conventional fuels to the sun; and explains the history of fuels. Animation is used to explain how heat is transferred to mechanical energy in steam, gasoline, and diesel engines. B/W EBF J.S.

98. SPACE PROBES -- EXPLORING OUR SOLAR SYSTEM (1 reel) With animation, live photography, and models of spacecraft and instruments, this film relates the story of man's efforts to explore the outer regions of space -- from the launching of Pioneer I in 1958 to the current program for gaining more information about the moon, the sun, and our solar system. The problems involved in collecting and relaying information from space probes and how they are being -- or will be -- solved, in preparation for manned space expeditions are explained. B/W EBF J.S.C.A.

100. LIFE STORY OF A MOTH -- The Silkworm (1 reel) Illustrates in detail the structural and behavioral changes which occur during the process of metamorphosis in the silkworm moth. Through detailed close-ups of the molting process, the complex behavior of the larva as it spins its cocoon, the emergence of the silkworm moth, its mating and laying of eggs, a vivid study is presented of the dramatic phenomenon of insect metamorphosis. Color EBF J.

110. WHAT IS SPACE? -- (1 reel) -- This film shows:
There is much space on earth.
There is much more space around the earth.
Space is not empty.
Outer space is occupied by the sun, moon, planets, and stars.
All through space -- on earth and in outer space -- there is movement.
The vast distances of outer space are measured in light years: a light year is the distance light travels in one year.
Space exists in objects that appear solid.
Scientists believe that "solid materials" are mostly space.
Space is everywhere.
"Empty" space is not really empty because, for example, light, heat, and radio waves are constantly passing through it. Color EBF J.

116. HIBERNATION AND OTHER FORMS OF DORMANCY (1 reel) Shows how various animals adjust to their environment during the winter months. As food becomes scarce and temperatures drop, some animals, such as the ground squirrel, go into hibernation. Some, like the spadefoot toad, go into a deep sleep called estivation. Others, such as the bear and racoon, merely sleep for long periods of time. B/W J.

117. EYES AND VISION (1 reel) Clearly designed animation sequences explain the structure and functions of the human eye and describe the complicated mechanism of human vision. The film also shows how the retinal image is inverted; how the lens changes shape to bring objects into sharp focus; and how the pupils open and close to regulate the amount of light entering the eye. Color EBF J.

118. WAVES AND ENERGY (1 reel) This film shows:
It takes energy to make waves.
Waves can carry energy from one place to another.
Waves take time to travel from one place to another.
Waves can be reflected.
In a train of waves, the distance between two successive parts that are alike is called one wave length.
The slower the frequency of a wave, the longer its wave length.
Waves can carry information. Color EBF J.

125. OUR ANIMAL NEIGHBORS (Second Edition) (1 reel, 11 min.). Unless we know what to look for, and where to look, we may not realize that many small animals are our neighbors. Here we become acquainted with animals which live in our parks, roadsides, back yards, or homes -- the rabbit, gray squirrel, red squirrel, fox squirrel, chipmunk, gopher, deer mouse, meadow mouse, shrew, mole and bat. Color Cor J.

136. MICROORGANISMS THAT CAUSE DISEASE (1 reel, 11 min.). A clear and comprehensive presentation of five kinds of pathogenic microorganisms, including fungi, bacteria, viruses, rickettsiae, and protozoa; this film stresses the concept that pathogenic microorganisms cause infectious diseases through destruction of cells. Abimated diagrams, photomicrographs, and electromicrographs show the structures of various microorganisms and the results of various kinds of cell destruction. Color COR J.S.

137. FLOWERS: STRUCTURE AND FUNCTION (1 reel, 11 min.) The specialized parts of a flower are seen in relation to their function of pollination and seed production. Iris, azalea, vetch and mustard flowers illustrate complete flowers; watermelon and pumpkin blossoms illustrate staminate and pistillate forms. Macroscopic and microscopic views show stamen, anther, pistil, stigma, ovaries, pollen and fruit. Pollination by insects and wind is illustrated, and time-lapse shows the growth of pollen tubes from pollen grains. Color COR J.S.

139. LAWS OF CONSERVATION OF ENERGY AND MATTER (3/4 reel, 8 min.) A background for understanding these laws and their importance as basic principles of science is clearly developed. Simple laboratory experiments and special photographic effects illustrate the important principle that matter and energy may not be created or destroyed, but, as explained by Einstein's equation, they can be converted into one another. B/W COR J.S.

143. EARTHWORM: ANATOMY AND DISSECTION (1 reel, 11 min.). Stressing correct laboratory techniques for dissection, this film gives the student a close look at the digestive, circulatory, excretory, nervous, and reproductive systems of the earthworm. The functioning of these systems is illustrated by means of extreme close-up photography, photomicrography, and diagrams. Color COR J.S.A.

144. DIFFUSION AND OSMOSIS (1 reel, 11 min.) The diffusion of gases and liquids, one of the key processes in living things, is fully illustrated in this film. The selective action of a semi-permeable membrane is shown experimentally; and time-lapse photography shows the effects of osmosis in various types of situations. The film defines and demonstrates such terms as permeability, osmotic balance, osmotic pressure, and turgor. Color COR S.

145. HUMAN BODY, THE: SKELETON (1 reel, 11 min.). This film explains the most important aspects of the human skeleton. Through cinefluorography, the audience gains an overview of the skeletal structure, the complexity of the system, and how the skeleton protects, moves, and supports the body. Color COR J.S.C.

149. EYES: THEIR STRUCTURE AND CARE (1 reel, 11 min.). Animation is used for a clear demonstration of the functioning of the eye and its structure. Common defects and how they are corrected are also shown, and the professions of the ophthalmologist, optomerist, and optician are explained. B/W COR J.S.

159. SIMPLE DEMONSTRATIONS WITH STATIC ELECTRICITY (1 reel, 11 Min.) This film presents the basic concepts of static electricity through skillfully performed demonstrations, which show that friction can produce static electricity; that there are positive and negative charges; that like charges repel and unlike charges attract; and that all matter is electrical. The demonstrations are presented in a spirit of inquiry which will encourage further experimentation and discovery. B/W COR J.

171. HEAT AND ITS BEHAVIOR (1 reel, 11 min.) This film clarifies basic concepts concerning the nature of heat -- its sources, measurement and utilization. Simplified animation illustrates that heat is molecular motion -- a form of energy, and that an increase in heat produces expansion of matter, because of increased molecular activity. We see that heat travels by conduction, convection, and radiation. Color COR J.

172. FRICTION AND ITS EFFECTS (1 reel, 11 min.) Friction can help us or hinder us, depending on how it is used and controlled. We are shown that when objects rub together, friction is produced -- a resistance to movement, which causes heat and wear. Illustrated are the effects, uses, and disadvantages of friction and methods of controlling it. B/W COR J.

174. MOON AND HOW IT AFFECTS US, THE (1 reel, 11 min.). Telescopic motion pictures and photographs show the "seas", craters, and mountain ranges of the moon; eclipses, the moon's phases, and its effect on the earth's tides are clearly explained. Information is given of the moon's size, movement and distance in relation to the earth. B/W COR J.

175. SOUNDS ALL ABOUT US (Exploring Science) (1 reel, 11 min.) Experiments with a tuning fork show that sounds are caused by vibrations or movement of different objects. Various sounds which all children will recognize are used to demonstrate that sounds can differ in pitch, in loudness, and in quality. B/W. COR J.

176. SIMPLE MACHINES: LEVERS (½ reel, 5½ min.) This film introduces the concept that the lever is a simple machine which can change the amount of force and/or its direction. The interrelationship of force and distance is clearly presented, and the film shows such familiar forms of the lever as a see-saw, nutcracker, and broom and examples of more complex machines which utilize the principle of the lever. B/W COR J.

177. DIGESTION IN OUR BODIES (1 reel, 11 min.). The steps in the digestive process are traced and functions of main organs explained. We are shown how and why food must be digested before the body can use it, and why correct eating attitudes and habits are important. X-ray technique and simplified diagrams help explain digestion. B/W COR J.

179. SPONGES AND COELENTERATES: POROUS AND SAC-LIKE ANIMALS (1 reel, 11 min.). Using underwater photography, this film shows the cell specialization, sexual and asexual reproduction, and life cycles of sponges and coelentrates, the simplest multicellular animals. The film features examples of the horny, calareous, and silicious sponges and uses the jellyfish, sea anemone, coral, and hydra to illustrate the basic characteristics of coelenterates. Color COR J.S.C.

184. FOSSILS: CLUES TO PREHISTORIC TIMES (1 reel, 11 min.). The exciting story of fossils -- where they are found, how they were formed, and what they tell us about the development of life - is the subject of this film. Museum dioramas, animation, and many fossil specimens are used to explain the work of scientists and their findings. Color COR J.

185. CLASSIFYING PLANTS AND ANIMALS (1 reel, 11 min.) Confusion can arise when plants and animals are called by common names. This film gives a short history of classification and introduces Linnaeu's system of binominal nomenclature. Through animation, we are shown how Linneau's system works. The classification of the common dog is traced through the major divisions of the animal kingdom. Color COR. J.S.

186. REPTILES AND THEIR CHARACTERISTICS (1 reel, 11 min.) The film study identifies the five orders of animals that make up the reptile group and points out their common characteristics and some of their differences. We see the snakes, lizards, turtles, crocodilians and the rare tuatara in their native habitats and learn something of how they live and reproduce, their adaptations to their enviornments, and some of the ways in which they benefit mankind. Color COR J.S.

192. EARS: THEIR STRUCTURE AND CARE (1 reel, 11 min.) Through animation and anatomical models, this film illustrates the structure of the outer, middle, and inner ear and describes in detail the role of each part of the ear in the hearing process. The importance of the semicircular canals as organs of balance is also shown. Proper care of the ear is discussed, as well as some common ailments of the ear and their treatment. B/W COR J.S.

193. CRAYFISH: LIFE CYCLE (1 reel, 11 min.). This common crustacean is introduced in its mud burrow habitat. Food habits, natural enemies, and general structure characteristics of arthropods are illustrated. Macrophotography shows mouth parts, gills, heart and statocyst. The life cycle is followed from breeding through development of eggs, hatching of larvae, molting and final adult state. Color CoR S.

201. HEALTHY SKIN (1 reel, 11 min.). The importance of clean and healthy skin is explained in relation to the structure and function of the skin. Animation aid. are utilized in examining pores, sweat glands, oil glands, blood vessels, nerve endings, and other parts. Color COR J.

206. RATIO AND PROPORATION IN MATHEMATICS (1 reel, 11 min.). This film shows that ratio expresses a relationship between two numbers and points out that equal ratios form a proportion which may be used in solving problems. It is stressed that the units must be the same in finding ratios between two numbers. B/W COR J.S.

209. LAWS OF GASES, THE (1 reel, 11 min.). The Gas Laws of Boyle, Charles, Dalton, and Avogadro are explained and their importance to physical science is emphasized. Animation clearly illustrates relationships between pressure, volume and temperature of confined gas, the law of partial pressures, and the determining of the molecular weight of a gas. B/W COR J.S.

210. ANIMALS WITH BACKBONES (1 reel, 11 min.). Through living examples and animation pupils see the basic structural differences between vertebrates and invertebrates. Fishes, amphibians, reptiles, birds, and mamals -- the five groups of vertebrates -- are seen and the characteristics of each group are emphasized. Color COR J.

217. GARDEN PLANTS AND HOW THEY GROW (Exploring Science) (1 reel, 11 min.). Time-lapse photography shows the growth of a seed plant and the photo-tropic nature of plants. Close-ups show the veins through which water is carried and the pores where air enters. The film covers seed dispersal, and the importance of proper soil and sunlight to plant growth. Color COR J.

224. POSTURE HABITS (Second Edition (1 reel, 11 min.). When their older brother shows them that they will look and feel better if they have good posture, Julie and Jerry begin a program of self-imporvement in posture. This second edition develops posture consciousness and motivates the cultivation of good posture habits in standing, walking, and sitting positions. B/W COR J.S.

225. HOW MATERIALS ARE ALIKE AND DIFFERENT (1 reel, 11 min.). All materials occupy space and have weight, but they differ in their properties. Observations and simple tests acquaint us with these properties - - density, flexibility, elasticity, solubility and tensile strength. Laboratory methods of testing properties are shown, and we learn how the properties of a material determine its use. Color COR J.

227. LIGHT ALL ABOUT US (Exploring Science) (1 reel, 11 min.) Through observation and experimentation David finds that we see only when there is light. This prompts him to delve into the phenomena of both reflection and refraction and to study such instruments as binoculars, magnifying glasses, mirrors, and eyeglasses. Color COR J.

230. REFRIGERATION AND AIR CONDITIONING (1 reel, 11 min.). Illustrating the basic concept that evaporation is a cooling process, this film uses animation and a model of a refrigerator with plastic coils to show how, through a continuous cycle of exaporation and condensation of a refrigerant, heat is absorbed from inside the insulated box and released outside. The same principles are seen in air conditioning systems, and convection currents are illustrated. B/W COR J.

231. DEVELOPMENT OF THE CHICK EMBRYO (½ reel, 5½ min.). This introductory study of embryology covers the basic processes of one type of reproduction. Living chick embryos are seen during each key stage of development. Embryonic movement, circulation of blood, the heartbeat, and the action of shell breaking by means of the egg tooth high-light this life study. Color COR J.S.C.A

234. PYTHAGOREAN THEOREM: PROOF BY AREA (½ reel, 5½ min.). In this film, animated diagrams provide a visual demonstration of the principles of geometric movement and transformation, to show how the square of each side of a right triangle may be transformed to a parallelogram of equal area, and how these may be proved to be equal in area to the square of the hypotenuse. B/W COR J.S.C.

238. ELECTRONS AND ELECTRONICS: AN INTRODUCTION (1 reel, 11 min.). This film clearly explains how such electronic devices as vacuum tubes and transistors work and how they are put to use in the fields of communication, transportation, medicine and industry. A visit to a broadcasting station shows us what part electronics plays in bringing us radio and television. B/W COR J.S.

239. UNDERSTANDING OUR UNIVERSE (1 reel, 11 min.). How man has learned about the universe from ancient times until the present day is demonstrated by this film which discusses our knowledge of the universe -- the solar system, Milky Way, and countless other galaxies and nebulae that extend millions of light years into space. B/W COR J.S.

242. METRIC SYSTEM, THE (1 reel, 11 min.). The history of the metric system and its uses today are included in this film which clearly illustrates the basic units. English and Metric units are compared, and the advantages of computations in the metric system are demonstrated. B/W COR J.S.

255. UNDERSTANDING OUR EARTH: SOIL (1 reel, 11 min.). Here is a lucid explanation of the soil profile (topsoil; subsoil, mantle rock, and bedrock), plus a breakdown of the elements of soil. The process of soil making is also treated -- how rocks are broken down by erosion and how decaying matter changes into humus. The types of soil throughout the United States, and the importance of conservation are other major points presented. Color COR J.

261. EARTH, THE: ITS ATMOSPHERE (1 reel, 11 min.). This film describes the structure and composition of the earth's atmosphere and shows characteristics of the troposphere, stratosphere, and ionosphere. We learn how the atmosphere provides moisture and gases necessary to life on earth, and how scientific instruments sent into the atmosphere are used to forecast weather. Color COR J.S.

262. CONSERVING OUR SOIL TODAY (1 reel, 11 min.) Latest techniques and experiments in soil conservation are shown in this film, such as the use of plastic sheets to retain moisture, subsoil mulching, new fertilizers, and experiments with artificial rain to determine patterns of soil erosion. The film also describes the more common methods of conservation, and emphasizes the pupil's own dependence on products of the soil. Color COR J.

263. SOLAR SYSTEM, THE (1 reel, 11 min.) The planets, their relative sizes distances from the sun, and the forces at work in the solar system are presented in this film with the help of a scale model. Differences between planets and stars, and highlights about gravity, light, and heat are other teaching points covered. B/W COR J.

264. NUMBER SYSTEM AND ITS STRUCTURE, THE (1 reel, 11 min.). This film reviews the concepts on which any number system is based and introduces the binary system used in electronic computers. A survey of the place of integers, fractions, and negative numbers in our number system and an explanation of the commutative, associative, and distributive laws and closure principles of arithmetic will give the student a basis for further progress in mathematics. B/W COR J.S.

267. SIMPLE DEMONSTRATIONS WITH AIR (1 reel, 11 min.). Air is all about us. We can't see it, but by performing some key demonstrations carefully graded to the curriculum level, we can see many of the things it does. This film demonstrates the basic concepts of air: air occupies space, air has weight, and air exerts pressure B/W COR J.

271. EARTH, THE: RESOURCES IN ITS CRUST (1 reel, 11 min.). This film surveys the major useful organic and mineral substances that are found in the earth's crust. The resources are classified as the metallic minerals, the non-metallic minerals, and the mineral fuels. We see how some of them are extracted and processed. Emphasized are the ways in which these resources are utilized by man, the steps we must take to conserve these irreplaceable resources. B/W COR J.

272. VOLUME AND ITS MEASUREMENT (1 reel, 11 min.). Using three-dimensional plastic models, this film demonstrates basic principles in measuring volume, and graphically illustrates the meaning of cubic units of measure. Volumes of prisms, pyramids, cylinders, and cones are found both by actual measurement and by the use of mathematical formulae. Practical applications for the use of these formulae are indicated. B/W COR J.

273. CONSERVING OUR WATER RESOURCES TODAY (1 reel, 11 min.). The population explosion and expanding industrialization have helped to make water one of our most precious resources today. This film dramatically surveys the domestic, agricultural, and industrial uses of water in the United States, diagrams the water cycle and shows our major sources of water. In addition, the film indicates methods for conserving surface and ground water, as well as for reclaiming and purifying water, in order to avoid future shortages. Color COR J.

278. COLOR AND LIGHT: AN INTRUDUCTION (1 reel, 11 min.). Characteristics of color formation by different kinds of light are demonstrated in a variety of everyday situations. Theatrical spotlights are used to show the effect of different kinds of light with opaque, transparent, and translucent objects. Color COR J.

281. ARITHMETIC: ESTIMATING AND CHECKING ANSWERS (1 reel, 11 min.). The key to estimating answers is knowing how to round off numbers. This film shows rounding off procedure, and how to apply rounded off numbers in estimating answers for help in solving problems with large numbers, in catching errors, and in placing the decimal point. The importance of checking as a means of being sure of a correct answer is emphasized. B/W COR J.

282. ALGEBRA: RELATION, FUNCTIONS AND VARIATION (1 reel, 11 min.). Using the subject of planets and their moons as a source of illustrations, this film explains the difference between a relation and a function, showing that a simple co-RELATION BETWEEN ELEMENTS DEFINES A RELATION, WHEREAS A ONE-to-one correspondence is necessary in a function. Variation is discussed and the difference shown between direct and inverse variation. B/W COR J.S.

283. REPRODUCTION IN ANIMALS (1 reel, 11 min.). This film introduces fundamental principles of the process of reproduction among animals. With the emphasis on reproduction in mammals, we observe various animals. The function of each parent, the three main types of sexual reproduction, the development of the embryo, and birth processes are illustrated. Color COR J.S.

285. GRAPHING LINEAR EQUATIONS (1 reel, 11 min.). This film introduces the concept of mathematical line graphs, working with simple linear equations. The film shows, in step-by-step detail, how line graphs are constructed and how these graphs represent the relationships between variables. The film also shows how the values of constant terms and varying coefficients affect graphs. B/W COR J. S.

295. EARTH, THE: CHANGES IN ITS SURFACE (1 reel, 11 min.). An erupting volcano, as shown in this film provides dramatic proof that the surface of the earth is changing. There are, however, other forces not so apparent that are also causing changes in its surface. These forces, both internal and external, are explained and visually demonstrated. Many geological phenomena are shown and defined; anticline, syncline, batholith, solfatara, fault, geyser, weathering, and others. Color COR J.

301. HOW GREEN PLANTS MAKE AND USE FOOD (1 reel, 11 min.). Stressing the concept that all living things depend directly or indirectly on food made by green plants, the film shows the factors required by green plants for life and growth: sunlight, carbon dioxide, water and soluble minerals. Described is the process of photosynthesis, by which chemical compounds are combined and changed within the plant to make food. Color COR J.S.

302. WEATHER: UNDERSTANDING STORMS (1 reel, 11 min.). This film shows how temperature, pressure and moisture interact to bring about the various types of storms: thunderstorm, tornado, hurricane, blizzard, dust storm, etc. The distinguishing characteristics of each type of storm are made clear. The film emphasizes the increasingly important role of meteorology, including weather satellites, in accurate forecasting of storms. B/W COr J.

310. GROWTH OF FLOWERS (Second Edition) (1 reel, 11 min.) The magic of time-lapse photography shows us in a few minutes a process which takes weeks to accomplish in nature. It shows us the miracle of growth -- action imperceptible to the human eye. Accelerated growth of the jonquil, jack-in-the-pulpit, phlox, lily, rose, zinnia, gladiola and water lily depicts sprouting, struggling for sunlight and life, and finally the bursting into bloom of the flowers. Color COR J.S.

311. HOW FLOWERS MAKE SEEDS (1 reel, 11 min.). A close-up examination of the lily flower identifies the parts of a flower and shows us how they function in the production of seeds. The film also pictures a variety of other flowers including some, like those of the maple, corn and wheat, which we might not recognize as flowers; and compares the flowering plants to some of the more familiar non-flowering plants. Color COR J.

313. WILDFLOWERS OF THE FIELD AND MEADOW (1 reel, 11 min.). Here we see the beauty and color of the sunflower, daisy, lupine, oswego, beebalm, bouncing bet, Queen Anne's lace, violet, marsh marigold, buttercup, and many others. The film groups the flowers by natural habitats, and gives helpful clues for recognizing them and the families to which they belong -- shape of leaves, blossoms, and habitat. Observation as well as conservation is stressed. Color COR J.

319. OUR SENSES: WHAT THEY DO FOR US (1 reel, 11 min.). Ways in which the five senses of the human body work alone and together to make us aware of our surroundings, how they serve to protect our bodies, and how they increase our enjoyment of living is carefully developed through live photography and animation. Proper care of these vital sense organs is emphasized and aids for defective sight and hearing are discussed. B/W COR J.

322. ARTHROPODS: INSECTS AND THEIR RELATIVES (1 reel, 11 min.). Through magnified close-ups, and detailed anatomical drawings, the camera reveals the major physical characteristics which identify the arthropods, the largest animal grouping. Examples from each of the four main classifications -- myriapods, insects, arachnids, and crustaceans -- are compared and studied with reference to their common characteristics, their natural environment, and the ways in which they are helpful and harmful to man. Color COR J.S.

324. PLANT-ANIMAL COMMUNITIES: PHYSICAL ENVIRONMENT (1 reel, 11 min.). Among the natural factors which influence any plant-animal community are altitude and atmospheric conditions; heat and light; water, and soil conditions. A quantitative analysis of these four factors in a deciduous forest, a coniferous mountain forest, a grassland, and a desert allow us to see relationships of these physical factors in a particular biome. Color COR J.S.

325. SUN AND HOW IT AFFECTS US, THE (1 reel, 11 min.). A comprehensive study of the sun is presented, including the sun's size, distance from the earth, physical nature, and its effect on life, weather, and tides on earth. A basic understanding of the probable origin and effects of the corona, prominences, flares, and sunspots is provided through telescopic action pictures. B/W COR J.

326. WEATHER: UNDERSTANDING PRECIPITATION (1 reel, 11 min.). Through live action and animation, this film explains the evaporation of water from the earth and its action and animation, this film explains the evaporation of water from the earth and its return as rain or some other form of precipitation. Relative humidity and dew point are clearly explained. Distinguishing characteristics and names of basic cloud types are shown, including the conditions that result in rain, snow, hail, dew, and frost. B/W COR J.

327. TRIANGLES: TYPES AND USES (1 reel, 11 min.). Animation illustrates some of the basic concepts of triangles such as their identification, their measurement, and the concept of congruency. The film describes the Pythagorean Theorem and its use, and shows the derivation of the formula for area. Live action scenes relate the mathematical concepts to the importance of triangles in daily life. B/W COR J.S.

338. BIRDS, AND THEIR CHARACTERISTICS (1 reel, 11 min.). This film shows in detail the characteristics which differentiate birds from the other groups of vertebrates. Features which all birds have in common are shown -- feathers, wings and legs, warm-bloodness, and beaks. We learn of theadaptations and special characteristics of several kinds of familiar birds. Unusual slow-motion photography shows details of a bird's flight. Color COR J.S.

339. AMPHIBIANS (1 reel, 11 min.). This film shows the similarities and differences of amphibians -- frogs, toads, and salamanders. We see how and where they live, what they eat, and what changes they undergo in their development and metamorphosis. A typical amphibian, the frog, is followed through its life cycle. Color COR J.S.

341. CAMOUFLAGE IN NATURE THROUGH FORM AND COLOR MATCHING (Second Edition) (1 reel, 11 min.). Camouflage for concealment from enemies is an adaption for survival found in many animals. Many species of mammals, birds, reptiles, fish and insects are seen in their natural environments to illustrate their own unique variations of camouflage through color and form: protective resemblance, mimicry, counter-shading, and color matching. Color COR J.S.

343. FISH AND THEIR CHARACTERISTICS (1 reel, 11 min.). Through underwater photography we are introduced to the characteristics of fish and shown how this group of vertebrates is fitted for its environment. The film illustrates the variety of form, protective devices, and reporductive methods in different types of fish. True fish are distinguished from other marine animals. The freshwater perch is studied as a representative fish. Color COR J.

344. CAMOUFLAGE IN NATURE THROUGH PATTERN MATCHING (Second Edition) (1 reel, 11 min.). As as adaptation to environment, many animals bear protective coloration that blends with their backgrounds. Among these, this film shows the bark moth, the tree frog, the ground squirrel, many birds, and the young of many mammals. Also shown are species that can change skin color to match their backgrounds, and those whose body outlines are broken up by bold areas of contrasting colors. Color COR J.S.

360. IMMUNIZATION (Second Edition) (1 reel, 11 min.). Explains what immunization is and how immunity to infectious diseases is attained. Points out that immunity to some diseases is effected through actual illness, and demonstrates that vaccine also builds up resistance to an infection. Shows the preparation and use of vaccine for smallpox, pneumonia, and diptheria.
B/W EBF J.S.

361. WHAT IS SOIL? (1 reel, 12 min.) Bobby wants to find out if he can grow beans in soil which he makes himself from crushed rock, rotting wood and leaves, and a few dead insects. The film then explains that Bobby's experiment duplicates, on a small scale, the natural process by which the earth's soil has been formed from eroded rock and decayed organic material. B/W EBF J.

364. LEARNING ABOUT SOUND (1 reel, 8 min.). Demonstrates how sound is produced, how sound travels, and how we hear it. Three common methods of producing sound - the vibration of a string, the vibration of a taut surface, and the vibration of a column of air - are explained and analyzed through the use of simple experiments and animated drawings. B/W EBF J.

366. LOOKING AT BIRDS (1 reel, 10 Min.) With vivid close-ups of a variety of birds in different environments, the film illustrates ways in which birds differ from other animals in appearance, body structure and functions, and behavior. It also shows some of the special ways in which birds are adapted to the places and conditions in which they live. Color EBF J.

373. THE MOLECULAR THEORY OF MATTER (Second Edition) (1 reel, 11 Min.) Through stop-motion photography and animation, this film presents the basic assumption of the kinetic molecular theory: matter in its three phases may be considered to be composed of small particles in motion. Experiments show the passage of one substance through another, how pressure of a gas can be measured, change of phase, and the diffusion in liquids. Color EBF S.C.

376. WHY SEASONS CHANGE (1 reel, 11 min.) Uses animation to demonstrate that the yearly seasonal cycle is caused by the cyclical change in the tilt of the earth's axis relative to the sun. Explains why temperatures change, why the length of the day varies throughout the year, why there is a seasonal difference between the Northern and Southern Hemispheres. B/W EBF J.

379. FOREST CONSERVATION (1 reel, 11 min.). Calls attention to the many ways in which man has depleted the forest by greedy and ignorant exploitation for his own gain. Forecasts the dire results of this exploitation if it is continued. Suggests what is being done, and must continue to be done, in order to save the forest and its vast resources. Color EBF J.S.C.A.

394. SIMPLE MACHINES: WHEELS AND AXLES (½ reel, 5½ min.). This film illustrates the force and distance relationships which exist in machines utilizing the principles of the wheel and axle. The way in which the working wheels of a bicycle increase force or distance is analyzed and visually demonstrated and the film examines such applications of the wheel and axle as the gear drive, belt drive, and crank. B/W COR J.

395. SCIENCE STUDY SKILLS (1 reel, 11 Min.) There are important differences between your general study skills and those you will have to use in science. The film stresses that the key lies in clearly understanding the definitions, and facts, concepts and theories that help unify science, as well as being aware that the materials of science are interrelated. In experimentation and observation, it is vital to follow a scientific method and be precise in observations, measurements, and record-keeping. B/W COR J.S.

396. SPACE SCIENCE: COMETS, METEORS, AND PLANETOIDS (1 reel, 11 Min.) This film introduces the minor members of the solar system and discusses theories explaining their origin. The use of the spectroscope and radio and optical telescopes in providing us with the information about these bodies is discussed. Events such as the meteor shower of 1833, the approach of Halley's Comet, and the movements of planetoids are shown in telescopic photographs, live photography animation and other special effects.
B/W COR J.S.

397. PLANT-ANIMAL COMMUNITIES: THE CHANGING BALANCE OF NATURE (1 reel, 11 Min.) Various plant and animal examples illustrate how such constantly changing factors as the rate of reproduction of a species, its available food supply, and its number of natural enemies largely determine the survival of a species within a biome. The film also shows some of the factors, including man, which may upset the balance of a community.
Color COR J.S.

402. TREES: HOW WE IDENTIFY THEM (1 reel, 11 Min.) Citing many varieties as examples, the film points out ways to identify trees by shape, bark, leaves, and fruit - and explains the differences between deciduous trees and evergreens. Individual characteristics of many trees are shown, and activities are suggested which will motivate students to take a greater interest in the trees in their own community. Color COR J.

408. CAUSES OF THE SEASONS (1 reel, 11 Min.) Animation techniques clearly illustrate the tilt of the earth's axis, the rotation of the earth on its axis, and the revolution of the earth about the sun. The film shows how these factors affect the comparative lengths of day and night and the angle at which the sun's rays strike the earth's surface, causing our changing seasons.
Color COR J.

415. UNDERSTANDING OUR EARTH: ROCKS AND MINERALS (1 reel, 11 Min.) The three classes of rocks - igneous, sedimentary, and metamorphic - are related to the natural conditions that produce them. The various uses of rocks and minerals in their natural state are explained.
Color COR J.S.

416. SIMPLE DEMONSTRATIONS WITH MAGNETISM (1 reel, 11 Min.) Interesting demonstrations and experiments explain and illustrate the basic concepts of magnetism: magnets produce a force, magnets have poles, magnets can make other magnets, and the earth is a magnet. Many of the experiments can be repeated in the classroom, while others use equipment not available in most schools.
B/W COR J.

420. SIMPLE MACHINES: PULLEYS (½ reel, 5½ Min.) Both the fixed pulley, which changes direction, and the movable pulley are examined in detail, including the block and tackle system. Effective motion picture techniques are used to bring out the functions of different kinds of pulleys as they are seen in everyday use.
B/W COR J.

422. SIMPLE MACHINES: INCLINED PLANES (½ reel, 5½ Min.)
A skillful combination of stop-motion photography and animation with familiar examples helps pupils recognize forms of the inclined plane, including screw and wedge, and to understand their function as simple machines. B/W COR J.

434. GROWING UP (Preadolescence) (1 reel, 11 Min.)
Nicky and Peggy with the help of other children, illustrate variations in the normal growth process. Animation and silhouette photography help to show that growing up is an uneven process, which differs between boys and girls, varying with individuals and age. The role of the endocrine glands in controlling growth is explained along with health measures which aid the normal growing process. B/W COR J.

438. PARTNERSHIPS AMONG PLANTS AND ANIMALS (1 reel, 11 Min.)
Three types of plant and animal partnerships are explored -- those between animals, between plants, and between plants and animals. In their natural settings, with close-up camera work, we see such interesting partnerships as that of the ant and aphid, the hermit crab and bryozoans, algae and fungi in lichen, red clover and nitrogen-producing bacteria, and red red clover and the bumble bee. Color COR J.

440. UNDERSTANDING OUR EARTH, HOW ITS SURFACE CHANGES
(1 reel, 11 Min.) This film acquaints pupils with the forces which build up and wear away the earth's surface over long periods of time. Scenes of volcanic eruption and lava flow, of wind and water at work, and of the geologic evidence offered by various formations, reinforce the key concepts of the film.
Color COR J.

442. ENGINES AND HOW THEY WORK (1 reel, 11 Min.)
Operating principles of various types of engines including steam gasoline, Diesel, turbine, jet and rocket are explained through the use of animation, models and live action. The film also developes an appreciation for the importance of engines and discusses briefly developments such as the free piston engine and the ionic-propulsion engine. B/W COR J.

444. UNDERSTANDING OUR EARTH: GLACIERS (1 reel, 11 Min. Glaciers from Alaska, the United States, Canada, and Europe show the different kinds and how they are formed. The formation of icebergs, and the significance and impact of glaciers during the ice age is discovered. Evidences of glaciation are seen in glacier lakes in the Rocky Mountains, soil in the Middle West, glacial drift in New England, and the Matterhorn peak in the Swiss Alps. Color COR J.S.

445. LET's LEARN TO PREDICT THE WEATHER (1 reel, 11 Min.) Weather facts which pupils can observe for themselves are presented in this film to give a basic understanding of why weather changes take place. The film shows the significance of barometer readings, wind direction, and types of clouds, and other interesting observations which will enable pupils to anticipate weather changes. Color COR J.

446. NUTRITIONAL NEEDS OF OUR BODIES (1 reel, 11 Min.) Using photomicrography, laboratory animals, and animation, this film shows how food provides the body's basic needs. The student will learn about the four general groups of foods, of the nutrients which they contain, and what the nutrients supply to the body. The importance of well-balanced diet to a strong body and good health is stressed. Color COR J.

453. PLANT TROPISMS AND OTHER MOVEMENTS (1 reel, 11 Min.) A variety of familiar plants, seen in time-lapse photography and in laboratory demonstrations, illustrate essential movements of plants in response to internal or external stimuli. The three basic types of movement are differeintiated: tropisms such as phototropism, geotropism, and thigmotropism; nastic movements such as nyctinasty and thermonasty; and nutational movements such as circumnutation. Color COR J.S.

454. INFECTIOUS DISEASES AND NATURAL BODY DEFENSES (1 reel, 11 Min.) Photomicrography, laboratory demonstration, and animation illustrate the two groups of natural defenses which guard the body against disease. Outer body defenses include the skin, passages of the nose and throat, and stomach acids. Among the inner body defenses are lymph glands, the chemical antibodies, the spleen and liver, and white blood cells, which are shown ingesting and destroying bacteria. Color COR J.S.

455. FOOD CYCLE AND FOOD CHAINS, THE (1 reel, 11 Min.) Animation and live action photography illustrate several examples of food chains, almost all of which depend ultimately on green plants. The film relates these food chains to the larger concepts of the oxygen-carbon dioxide and the nitrogen cycles, and to the unending pattern of life, growth, and decay which is known as the food cycle. Color COR J.S.

456. FIRE AND OXIDATION (1 reel, 11 Min.) We retrace the experiments of Priestley and Lavoisier which led to the discovery of a new element, oxygen, and to an explanation of combustion as rapid oxidation. Further exploration of the oxidation of various elements, and different rates of reaction, leads us to a unified view of oxidation as a fundamental process of chemistry. Color COR J.S.

457. ANGLES AND THEIR MEASUREMENT (1 reel, 11 Min.) Live photography and animated diagrams show how angles are drawn, measured, named and identified. The film illustrates basic terms such as point, line segment, and ray; the different kinds of angles; and the relationship between central angles and intercepted arcs. The importance of a knowledge of angles to a further study of mathematics is emphasized throughout the film. B/W COR J.S.

458. TEETH, THEIR STRUCTURE AND CARE (1 reel, 11 Min.) Skillful animation shows the functions of various teeth, the structure of a tooth, and how decay spreads. Students are motivated to proper dental care as a means of insuring dental health. B/W COR J.S.

462. ELECTRICITY: PRINCIPLES OF SAFETY (1 reel, 11 Min.) The common hazards of electricity and their causes are pointed out in this film. We see how overloaded circuits and short circuits can create fire hazards, how the fuse and circuit breaker function as safety devices, and how bodily harm can be avoided by a proper knowledge of the behavior of electricity and electric circuits. B/W COR J.

463. ELECTRICITY: HOW IT IS GENERATED (1 reel, 11 Min.) Through the use of a simple working model, this film demonstrates the basic principles of the generation of electricity, the difference between alternating and direct current, and the nature of the electrical circuit. These principles are seen at work in the commercial production of electricity by the steam turbine, water power and atomic power. B/W COR J.

464. PYTHAGOREAN THEOREM, THE COSINE FORMULA (½ reel, 5½ Min.) This film shows how the Pythagorean Theorem may be applied to acute angled triangles in addition to right triangles, and how this leads to the cosine formula. Animated drawings prove that as the acute angle approaches a right angle, its cosine approaches zero, so that the Pythagorean Theorem reappears. B/W COR J.S.C.

466. LIFE IN A VACANT LOT (1 reel, 10 Min.) Presenting the interrelationships of organisms living in the urban vacant lot, this film inquires into the environmental factors influencing the balance of life in this community. A changing community which can be found almost anyplace, a vacant lot has a short life because it is replaced by construction or plantings, and is eventually "disturbed" by man. Seasonal changes do not radically affect a lot. This is a case study type of film, encouraging students to investigate the kinds of life to be found in the vacant lots in their own communities. Color J.

472. AIR, ALL ABOUT US (Exploring Science) (1 reel, 11 Min.) Watching a feather floating down, David becomes aware of the ocean of air surrounding the earth. He learns that air exerts pressure in all directions. This information helps him to explain the use of air pressure in suction cups, bicycle and automobile tires, a car lift, and airplanes. B/W COR J.

473. SYMBOLS IN ALGEBRA (1 reel, 11 Min.)
Using animation and other special film techniques, this film shows how algebra employs rules for working with numbers. In addition the film illustrates how a symbol may also be used to represent an unknown quantity in an equation.
B/W COR J.S.

478. SIMPLE CHANGES IN MATTER (1 reel, 11 Min.)
We observe the physical and chemical changes that surround us every day -- such as growth of seedlings, soil erosion, metal expansion, ice melting, leaves changing color, logs decaying and metal rusting. Through simple experiments, the differences between physical and chemical changes are made clear. Color COR j.

482. HEART, LUNGS, AND CIRCULATION (1 reel, 11 Min. How the heart lungs, viens, arteries and capillaries work together in the process of circulation is explained. Animation, cinefluoragraphy, and a unique combination of artwork and a live subject visualize key functions. Princliples to help maintain healthy heart and longs are suggested. Color J.

488. EARTH, THE: ITS STRUCTURE (1 reel, 11 Min.) Animated drawings present the most widely accepted theory of the formation of our earth and solar system. Through simple sketches, clear shots of various geological phenomena, and laboratory demonstrations, we examine the structure of the surface and interior of the earth: core, mantle, and crust. The latter region is discussed in detail. Color COR J.

490. INFECTIOUS DISEASES AND MAN-MADE DEFENSES (1 reel, 11 Min.)
This film shows some of the causes of infectious diseases and explains at length how we use man-made defenses to protect ourselves. We see how antitoxins; vaccines, antibiotics, and synthetic drugs are produced and used to help develop active and passive immunity in the body. Color COR J.S.

512. WEATHER: WHY IT CHANGES (1 reel, 11 Min).
An understanding of weather has always been of critical importance to man. This film gives a simple and clear explanation of how and why changes in weather occur. It locates the air masses which govern major weather changes in North America, and shows what happens when these masses interact, forming cold fronts, warm fronts and occluded fronts. B/W COR J.

516. HEALTHY FEET (1 reel, 11 Min.)
The structure of the foot is explained with the use of X-Ray and animation, and the slow motion camera shows the function of each part in body motion. The importance of healthy feet and proper care to prevent skin diseases and other dangers is emphasized.
Color COR J.

539. INTRODUCING ATOMS AND NUCLEAR ENERGY (1 reel, 11 min.) Vivid illustrations coupled with a clear, step-by-step development provide young students with an understanding of the structure of the atom and an explaination of how energy is released from a nuclous. Basic terms such as nucleus, proton, electron, neutron, radioactive and chain reaction are carefully illustrated through animation, models and demonstrations with actual applications of nuclear energy. B/W COR J.

543. HOW TO FILLET FISH (11 minutes)
Teaching film on how to fillet both roundfish and flatfish; step-by-step procedure using animation to clarify the processes.
B/W Depostied by - U. S. Department of the Interior

2001. FUNDAMENTALS OF THE NERVOUS SYSTEM (2 reel, 17 Min.) Illustrates the two major divisions of the nervous system and explains their functions. With live photography, photomicrography, animated drawings and demonstrations, the film shows how the nervous system conveys external information from the sense organs to the brain, coordinates the information with present and past experience, and directs muscles and other organs to adaptive behavior. Color EBF S.C.

2004. DNA: MOLECULE OF HEREDITY (2 reel, 16 Min.) Dr. George W. Beadle, discoverer of DNA and Nobel prize winner, explains why DNA (deoxyribonucleic acid), a giant molecule of the cell's chromosomes, is the basis of growth and reproduction and the mechanism for transporting hereditary "specifications" from one generation to the next. Illustrated with photomicrography, animation, and models. Color EBF S. C.

2005. THE CHICK EMBRYO: FROM PRIMITIVE STREAK TO HATCHING (2 reels, 13 Min.) Demonstrates the development of a chick embryo during incubation and its emergence from the shell. Time-lapse photography and photomicrography are used to show the chief processes in the development of the chick embryo from primitive streak to hatching. Color EBF S.C.

2006. THE BLOOD (2 reels, 16 Min.) Describes the circulation of the blood, its composition, and its functions in supporting cell processes. Photomicrography, animation, and demonstrations are used to show blood cell structure and locomotion, the formation of new blood cells, blood circulation and capillary structure and function. The film also explains blood typing and the test for the Rh factor. Color EBF S. C.

2007. ADAPTIVE RADIATION - THE MOLLUSKS (2 reels, 18 Min.) Illustrates the principle of adaptive radiation and shows how the typical molluscan characteristics are modified in each of the six chitons, snails, clams and oysters, tooth shells, and the squid, is used to show the ways in which mollusks are adapted to specialized and different ways of life. Color EBF S. C.

2008. FUNGI (2 reels, 16 Min.) Demonstrates that fungi are simple plants which are dependent upon other organisms for food. Illustrates how fungi grow and how they get their food. Explains the importance of fungi as a source of food, and agents in food processing, and as a cause of disease in plants and animals. Color EBF S. C.

2009. SEED GERMINATION (2 reels, 15 Min.) Explains how seeds serve plants in reproduction, distribution, and as a device to survive unfavorable climatic periods. Shows how seed germination studies aid biologists in understanding growth, development, and metabolism. Illustrates the importance of seeds as a source of food for man. Demonstrations with germinating seeds are shown using time-lapse photography. Color EBF S. C.

2010. WHAT IS A REPTILE? (2 reels, 18 Min.) This film illustrates representative kinds of the four orders of reptiles and describes their physical characteristics, reproductive processes, and evolutionary development. Discusses reasons for the reptiles' successful evolution and survival - the evolution of the land egg, the waterproof skin, and the improved limbs. Describes the characteristics and behavior of a wide variety of reptiles. Color BBF S. C.

2011. GYMNOSPERMS (2 reels, 17 Min.) Demonstrates that gymnosperms are seed plants which bear their seeds on cones. Animation and time-lapse sequences trace the life cycle of the pine through the growth of the pollen and seed cones, pollination, fertilization, and germination of seeds. Examples of lesser-known gymnosperms are shown and the importance of conifers is illustrated. Color BBF S.C.

2012. ELECTRONS AT WORK (2 reels, 14 Min.) This film shows:
An electron carries an electric charge.
Electrons are far too small to be seen, but we can observe things they do.
An object must have mass to move another object by colliding with it.
Electrons have mass and can move objects by colliding with them.
All objects are made of atoms. All atoms contain electrons.
When an object has too many or too few electrons, it is said to have an electric charge.
Objects with like charges repel each other. Those with unlike charges attract each other.
The fact that electrons can be controlled makes them useful in many ways. Color BBF J.

2013. FORCES (2 reel, 14 Min.) This film shows:
A force is a push or a pull.
When forces acting on an object are balanced, the object remains motionless; when the forces are unbalanced, the object moves.
Pairs of forces can change the shape of an object.
Machines make it possible to change the direction or size of a force.
An impact can transmit a force.
Three kinds of forces that act between objects not touching each other are magnetism, electricity, and gravity.
Color BBF. J.

2014. ATOMIC ENERGY - INSIDE THE ATOM (2 reels, 14 Min.)
Film Shows:
Evidence of atoms breaking up may be seen in a cloud chamber.
Geiger counters are used to detect radioactive substances.
Atoms have a central core called a nucleus.
The nucleus of a radioactive atom is unstable or unbalanced.
Because the nucleus of a radioactive atom is unbalanced, fragments of it are thrown out.
All atoms are not radioactive,
Many substances in nature, such as uranium, are naturally radioactive.
Nonradioactive substances can be made radioactive. A nuclear reactor is a machine that can make a nonradioactive substance radioactive.
Radioactive substances can be used in many ways: in medicine, and to produce heat, power, and light.
Radiation can do work because it carries energy.
Color EBF J.

2015. ENERGY AND WORK (2 reels, 11 Min.) This film shows:
Work means using energy to make an object move, or to make it stop moving.
It takes energy to do work.
Energy can be stored. Energy that is stored is called potential energy.
There is potential energy stored in many things: gasoline and other fuels, a hanging sandbag, a wound-up rubber band.
There is energy in all moving objects.
The energy in moving objects is called kinetic energy.
Energy can be changed from one form to another.
All energy can do work. Color EBF J.

2016. EVIDENCE FOR MOLECULES AND ATOMS (2 reels, 19 Min. Film shows:
Circumstantial evidence is a valuable scientific tool.
Scientists often use circumstantial evidence to prove the existence of unseen things.
Circumstantial evidence indicates that air and water are made up of small particles. These small particles are called molecules.
The structure and properties of crystals suggest that they are made of tiny building blocks.
Atoms are the building blocks from which molecules are made.
Modern science is based on the existence of atoms and molecules.
Color EBF J.

2017. EXPLAINING MATTER: ATOMS AND MOLECULES (2 reels, 14 Min.)
Shows that atoms are the building blocks of matter which combine to form larger particles called molecules. Explains that elements are homogeneous and irreducible because they are made up of like atoms, while compounds can be chemically reduced, because their molecules are made up of two or more atoms. Describes mixtures as combinations of elements and/or compounds which do not combine chemically but exist side by side without changing.
Color EBF J.

2018. THE EARTH IN CHANGE: THE EARTH'S CRUST (2 reels, 16 Min.) Tells the story of the changing land features of our planet. Shows that the earth's crust is constantly being changed by the action of dynamic natural processes: erosion, folding, sedimentation, volcanic action, and earthquakes. Describes how the earth's geologic history can be deduced from careful study of the present structure of the earth's crust. Color EBF J.S.

2022. OSMOSIS (2 reels, 17 Min.) By means of photomicrography, time-lapse photography, and animation, this film illustrates the inner mechanism of plants and explains how water is transported throughout the plant. Laboratory experiments illustrate osmosis action, and the other film techniques support the laboratory experience by explaining the laws of nature that make osmosis work. Color EBF J. S.

2027. CONSERVATION ROAD (2 reels, 18 Min.) Presents the story of America's natural resources and stresses the need for continuous education of the public in effective ways of conserving them. B/W EBF J.A. S.

2039. THE FRESH WATER POND (2 reels, 13 Min.) Divides fresh-water pond life into two categories: Plants and animals which can be seen with the naked eye (snails, duckweed plants); and organisms which must be observed with a hand lens (water fleas, water bears), or with a microscope (amoebas, stentors, euglenas). Shows that the fresh water pond is a self-sufficient community of interdependent life forms. Color EBF J.

2042. MINERALS AND ROCKS (STONES OF THE EARTH) (2 reels, 16 Min.) The camera follows two young rock collectors as they gather specimens and make standard identification tests, such as color, streak, hardness, chemical and frature tests. The film also shows how igneous, sedimentary, and metamorphic rocks were formed, and explains ways of recognizing each. Color EBF J.

2048. SIMPLE PLANTS - THE ALGAE (2 reels, 18 Min.) This film illustrates typical forms of algae, explains their structure, describes their evolutionary development, and shows how algae have adapted to all types of moist environments. The reproductive processes of algae are shown with photomicrography. The importance of algae to aquatic animals and man is explained. Color EBF S.C.

2049. MEIOSIS: SEX CELL FORMATION (2 reels, 16 Min.) Explains how meiosis, or the reduction division, occurs in the formation of sex cells. Illustrates the sequence of changes in the parent-cell nucleus which results in the creation of two daughter cells, each having half as many chromosomes as the parent cell. Shows how meiosis enables plants and animals to produce offspring with a wide variety of characteristics, and explains the role of meiosis in evolution. Color EBF S. C.

2052. THE FROG (Second Edition) (2 reels, 11 Min.) Compares frogs with other amphibians and their close relatives. Shows the complete life cycle of the frog - egg stage, development of embryo by time-lapse photography, development of the gill-breathing frog. Depicts structural characteristics, life habits, habitats, enemies, and means of survival. Shows economic use as food, fish bait, and in science studies. Color EBF J.S.C.A.

2061. WHEAT RUST (2 reels, 15 Min.) Illustrates the characteristics and life cycle of a parasitic plant - the wheat rust fungus. Explains why wheat rust is a problem of great concern to farmers and agricultural scientists throughout the world, and shows how many have attempted to control the fungus by breeding new strains of wheat with rust-resistant qualities. Color EBF S.C.A.

2068. EXPLAINING MATTER: CHEMICAL CHANGE (2 reels, 11 Min.) Illustrates that a chemical change takes place when atoms from the molecules of two or more materials join with each other to form molecules of entirely different materials. Reveals that the most important chemical changes do not take place in laboratories: burning is a common chemical change which releases heat and light; digestion of food provides energy for the human body; and plant photosynthesis produces the oxygen and food which sustain life on earth. Color EBF J.

2069. MIGRATION OF BIRDS O THE CANADA GOOSE (2 reels, 11 Min.) Illustrates the yearly cycle of this migrating bird, presenting facts and theories about the phenomenon of migration. Follows a spring flight to southern Canada, where the geese find a plentiful food supply and adequate space to nest and raise young. Shows what geese eat, how they protect themselves against enemies; and explains what is meant by "flocking." Closes with a sequence showing migration back to the mild Gulf climate. Color EBF J.

2071. GEOLOGICAL WORK OF ICE (Second Edition) (2 reels, 11 Min.) Combining animated drawings with natural photography, this film explains how ice, through geologic ages, has been a powerful factor in sculpturing the face of the earth. It reveals the tremendous effects of ice on soil and rock as it constantly expands, contracts, and moves. An animation sequence shows how glaciers form, move, and alter surrounding terrain features. The closing scenes trace the advances and retreats of ice sheets on the North American Continent during the latest of the earth's many ice ages. Color EBF S.C.A.

2072. GRAVITY: HOW IT AFFECTS US (2 reels, 14 Min.) Illustrates the concept of gravity and shows its effect upon the earth and the universe. Demonstrates how the force of gravity can be used to do work, how gravity affects our daily lives, and how it would affect a human being in space or on other planets. Simple demonstrations and animation are used to show the effects of gravitational force. B/W EBF J.

2073. SUCCESSION - FROM SAND DUNE TO FOREST (2 reels, 16 Min.) Illustrates the process and general principles of ecological succession by which an area slowly and continuously changes until it becomes a stable natural community. This film, photographed in the dunes at the southern end of Lake Michigan, shows one of the earliest and most thoroughly studied examples of this process. Color EBF S. C.

2074. STARS AND STAR SYSTEMS (2 reels, 16 Min.) Illustrates the work of astronomers with the reflecting telescope and the radio telescope. Shows how astronomers rely on theoretical analysis as well as direct observation for answers to the mysteries of the universe. Life photography and film animation of stars and star systems are used to explain current concepts of the universe and its structure. B/W EBF J.S.

2083. INTRODUCING INSECTS (2 reels, 17 Min.) Explains how insects differ from other animals and how the main orders of insects differ from each other. Uses magnified close-ups, slow-motion and time-lapse photography to reveal the structure and characteristics of insects, and to show different stages in their life cycles. Illustrates these orders: Orthoptera (grasshoppers), Siphonaptera (fleas), Coleoptera (beetles), Lepiodoptera (butterflies and moths), Hymenoptera (bees, ants, and wasps), Hemiptera (bugs), and Diptera (flies). Color EBF J.S.

2084. ELECTROMAGNETS: HOW THEY WORK (2 reels, 11 Min.) Demonstrates that an electromagnetic field is created by the flow of electricity through a conductor, and shows how a simple electromagnet can be constructed. Explains that electromagnets have technological advantages over permanent magnets - electromagnets can be turned on and off, and they can be strengthened by using a core, extra coils, or more current. Indicates that there is a relationship between electricity and magnetism. Color EBF J.

2086. THE FACE OF THE HIGH ARTIC (2 reels, 14 Min.) A unique camera study that reveals a vivid detail the crushing impact of glaciers, the spectacular beauty of icebergs, jagged mountains of rock split by frost, and the erosive results of an inch-by inch flow of water for centuries. Shows evidence of an earlier life in this frozen land, along with unusual scenes of the region's natural resources. Color EBF J.S.C.A.

2093. AIRPLANES: HOW THEY FLY (2 reels, 11 Min.) Exciting sequences of a light airplane in flight and views of a large model aircraft being constructed are used to demonstrate basic concepts of flight. The film takes its audience up for a ride in an airplane and shows how the pilot controls the airplane's flight. Animated drawings show how the passage of air past the wing creates the difference in pressure which lifts the airplane into the air. Color EBF J.

2099. BEGINNINGS OF VERTEBRATE LIFE (2 reels, 11 Min.) Reveals, by means of time-lapse photomicrography, the amazing processes that transform a one-celled zygote into a multi-celled, highly specialized organisms. The film is based on the work of Dr. Tokio Yamamoto, a Japanese scientist, who has devised a method whereby an Oryzias latipes egg can be fertilized artifically, and making it possible to observe, under laboratory conditions, the development of a vertebrate embryo from fertilization to hatching. Color EBF J.S.

2105. THE FIRST MANY-CELLED ANIMALS - THE SPONGES (2 reels, 17 Min.) Demonstrates that the sponge represents one development of multicellularity in animals, and shows some of the adaptations of the body plan of this primitive animal. Live photography, animation, photomicrography, and laboratory experimentation are used to show life processes and adaptation of sponges to their environment. Color EBF S. C.

2106. THE COMMUNITY (2 reels, 11 Min.) Introduces the concept of the ecological community. Shows the complex networks of interrelationships among a group of plants and animals adapted to the same general physical conditions, and demonstrates that each organism in a community plays a particular role. Food chains and food webs of typical biotic communities are illustrated Color EBF S. C.

2113. THE MARINE BIOLOGIST (2 reels, 14 Min.) Presents an intimate portrait of scientists at work, permitting the viewer to discover why men and women devote their lives to the study of living things of the sea. Shows both the excitement of discovery of new knowledge about life and the challenge of the elements which the biologist faces at a marine station. Color EBF J.S.

2121. SEGMENTATION - THE ANNELID WORMS (2 reels, 16 Min.) Describes the structure and functions of the segmented worm body systems, and shows that the segmented annelid worm body plan represents an important evolutionaty development. The major classes of the phylum Annedlida are illustrated. Animated drawings show the structure and functions of the nervous, digestive, and reproductive systems of the earthworm. Color EBF S.C.

2123. LAWS OF HEREDITY (2 reels, 15 Min.) How does "like beget like?" The film answers this question by showing, with clear, simple logic, that inheritance is determined in statistically predictable ways. It presents the insights and conclusions about inheritance that were first achieved by Gregro Mendel. The laws of heredity are the cornerstone of the modern science of genetics, and necessary to our understanding the process of natural selection. Color EBF S. C.

2125. FIRST MEN INTO SPACE (SOLVING THE SPACE SURVIVAL PROBLEMS) (2 reels, 16 Min.) Re-creates, with live photography, film animation, and scale models, the first American orbital space flight, and illustrates some of the problems of man's survival in this hostile environment. Shows how such problems as decreased air pressure, multi-wieght, and weightlessness were studied and how solutions were applied by engineers to the first space capsule project. B/W EBF J. S.

2126. ECHINODERMS - SEA STARS AND THEIR RELATIVES (2 reels, 17 Min.) Describes the characteristics of the echinoderm body plan and shows how it is adapted for locomotion, respiration, digestion, and reproduction. With examples of the five classes of echinoderms shown, and the various stages of reproduction and development are illustrated with live photography and photomicrography. Laboratory experiments using sea urchin eggs are shown. Color EBF S. C.

2133. THE PHYSICAL ENVIRONMENT (2 reels, 11 Min.) Illustrates some of the ways in which organisms are adapted to the conditions of their physical, or non-living environment - and demonstrates how various conditions of the physical environment can be measured. Offers examples of specific adaptations by organisms to particular physical factors in their environments. Color EBF S. C.

2134. GENE ACTION (2 reels, 16 Min.) Laboratory demonstrations and effective animated diagrams are combined to illustrate the stmucture of DNA; to show how DNA replicates itself; and to explain how the DNA code determines the structure of a cell's proteins. The film recreates an experiment with Neurospora, which gives conclusive proof that genetic mutation results in an organism's inability to carry on specific biochemical reactions. Color EBF S. C.

2135. FLATWORMS (PLATHELMINTHES) (2 reels, 16 Min.) Introduces the organization and functions of the flatworm body, and illustrates the advance it presents over the more primitive coelenterates. Regeneration demonstrations with planarias illustrate the principles of polarity, anterior-posterior gradient, and dominance. Color EBF S. C.

2137. CHARTING THE UNIVERSE WITH OPTICAL AND RADIO TELESCOPES (2 reels, 13 Min.) The film explains and illustrates the instruments and methods used by astronomers in their search for facts about the universe. It describes the work of radio astronomers who locate and record radio signals from outer space and of astrophysicists who analyze starlight to discover the age, physical structure, temperature, and movements of stars. The final sequence presents a dramatic example of cooperation between astronomers in different observatories in solving one of the "mysteries" of outer space. B/W EBF J.S.C.A.

2139. WHAT IS ECOLOGY? (2 reels, 11 Min.) Introduces the study of ecology by illustrating the wide variety of interrelationships between plants, animals, and their environment. Shows how biologists study these interrelationships and explains the importance of such studies to mankind. The major biomes of the world are introduced. Color EBF S. C.

2145. HOW PINE TREES REPRODUCE - PINE CONE BIOLOGY (2 reels, 11 Min.) With expert time-lapse and close-up photography, the film examines the processes involved in the reproduction of pine trees: the opening mechanism of pine cones, the fertilization of seed-producing cones by wind-borne pollen from male cones, the dissemination and the germination of seeds. The film also stresses the importance of continuing research to conserve and to improve the quality of North America's valuable pine forests. Color EBF J. S. C.

2148. METAMORPHOSIS - LIFE STORY OF THE WASP (2 reels, 14 Min.) Presents the life cycle of a solitary wasp as an example of insect development from egg to larva to pupa to adult stage. Use of photomicrography reveals the developmental process known as metamorphosis and illustrates the seldom seen - and rarely photographed - dramatic change in body organization that takes place within the cocoon. Color EBF J. S.

2150. EROSION - LEVELING THE LAND (2 reels, 14 Min.) This film examines the surface processes of weathering, erosion and deposition. Rocks gradually rust, crack, disintegrate, and decompose. This loosened rock debris can go in only one direction - down. Sometimes this movement is spectacular as in a landslide. Other times the movement is subtle, as in soil creep. The net effect of transferring rocky material from high ground to basin areas is always in the direction of leveling the land. The film ends with the question, "If all the land above sea level is constantly being washed into the oceans, why, then, aren't all land surfaces not only flat but also level with the seas?" Color EBF J.

2151. ROCKS THAT FORM ON THE EARTH'S SURFACE (2 reels, 16 Min.) This film investigates the processes which produce sedimentary rocks, with emphasis on sandstone and shale as examples of clastic rocks. The sediment is first traces to its upstream source and then downstream to its site of accumulation. Sedimentary layers are examined by using laboratory models. Compaction and cementation, two essentials for making loose sediment into hard rock, are examined separately - first in nature and then in the laboratory. The origin of limestone and coal are explained. The film ends with questions about the origins of certain types of sedimentary rocks. These questions can be investigated by the student, using concepts described earlier in the film. Color EBF J.

2152. AMPHIBIAN EMBRYO (Frog, Toad, and Salamander) (2 reels, 16 Min.) Combining time-lapse and microphotography with animated cross-section diagrams, the film illustrates the complex developmental processes by which a single-celled amphibian egg is transformed into a many-celled adult organism: fertilization, cleavage, formation of the blastula, gastrulation, development of organs and tissues, and hatching. Color EBF J.S.C.

2153. BACTERIA (2 reels, 19 Min.) This film demonstrates the basic characteristics of bacteria: their external and internal structures, their manner of feeding, and their reproductive processes. Shows how bacteria are classified, and describes their ecological importance as the first link in certain food chains and as a cause of decomposition. Photomicrography is used to show cell division and conjugation. Color EBF S, C.

2154. THE TROPICAL RAIN FOREST (2 reels, 17 Min.) This film illustrates the interrelationships between the rich variety of plant and animal life and the warm, humid environment of the tropical rain forest. Shows the layered structure of tropical rain forest vegetation, describes conditions of temperature and rainfall, and provides examples of both typical and rare species of tropical rain forest animal and plant life. Color EBF S. C.

2155. THE SINGLE-CELLED ANIMALS - PROTOZOA (2 reels, 17 Min.) Illustrates the characteristics and behavior of representatives of each class of protozoans, demonstrates the processes of digestion and reproduction in representative protozoans, and discusses theories of protozoan evolution from ancient single-celled plants. Shows the structures which various classes of protozoans use for movement and food-gathering. Photomicrography is used throughout the film. Color EBF S. C.

2156. WHAT IS AN AMPHIBIAN? (2 reels, 11 Min.) Illustrates the body structure and life process of amphibians and shows how they are adapted to live in water and on land. Presents the development of an amphibian from egg to maturity and traces the origin and evolution of the amphibian. Discusses the ways in which the study of amphibians has contributed to man's knowledge of embryology and development. Color EBF S. C.

2157. MICROSCOPIC LIFE: THE WORLD OF THE INVISIBLE (2 reels, 14 Min.) Explores the world of microscopic plants and animals in a jar of ordinary pond water. Describes methods of classifying the many forms of microscopic life, and examines the life processes of both one-celled and many-celled animals - their methods of food-gathering, digestion, and reproduction. Illustrates interrelationships of plants and animals in their fresh-water environment. B/W EBF J.

2158. THE HOUSEFLY (Second Edition) (2 reels, 17 Min.) Makes use of unusual techniques of microphotography and magnification to portray the habits and life history of the common housefly and the ways in which it is a menace to health. Traces physical development from egg-laying through larval and pupal states to the emergence of the young fly. Magnified views reveal biological structure and methods of carrying and spreading disease germs. Suggests practical control methods. Color EBF J.S.A.

2159. EARTH SATELLITES: EXPLORERS OF OUTER SPACE (2 reels, 17 Min.) Illustrates the basic principles of space exploration with earth satellites and discusses the present and future uses of such exploration. Live photography and animated drawings are used to show the launching and orbiting of the Explorer and Vanguard satellites, the structure of the atmosphere, the physical laws governing orbiting satellites, and the nature of outer space. Color EBF J.S.

2161. WHAT MAKES THE WIND BLOW? (2 reels, 16 Min.) The film is a step-by-step search for the cause of a typical on-shore breeze. The search is advanced by proposing possible explanations, trying them out in the laboratory, and then double-checking them in nature. Pressure differences are found to be associated with the normal daytime air movement - but there are exceptions. The student discovers that, through principles established earlier in the film, local beach conditions can be overwhelmed by larger and stronger air movements. The film ends with a question about the origin of a particular wind in California. Color EBF J.S.A.

2164. THE DIGESTIVE SYSTEM (2 reels, 17 Min.) Combining highly detailed, creative animation with actual laboratory research techniques, this film presents a vivid, descriptive illustration of the complex process of human digestion. An entirely new visual treatment, including remarkable scenes of human digestion filmed by X-ray motion picture photography, is also incorporated. Color EBF J.

2165. THE HOUSE OF MAN - OUR CHANGING ENVIRONMENT (2 reels, 17 Min.) This film reveals the waste of resources in cities, woodlands, farmlands, and the pollution of river waters and of the air. Comparison is made between progress through wasteful methods, and through the intelligent preservation of resources. The film emphasizes that in "The House of Man" - the planet Earth - it is necessary to weigh values: Conservation versus destruction. Color EBF J.S.C.A.

2167. WHAT MAKES CLOUDS? (2 reels, 19 Min.) The film takes a close look at fog and at clouds. The pupil discovers that both are formed by droplets of water and also learns where this water comes from. This research leads to evaporation and transpiration as sources of invisible water vapor, but it does not explain how clouds are formed from the vapor. This problem is solved by lavoratory experiments with condensation. The film closes with an investigation of how condensation occurs in nature and a discussion of the differences between clouds and rain. Color EBF J.S.A.

2168. THE MARSH COMMUNITY (2 reels, 12 Min.) Since the marsh is a changing environment, it provides excellent opportunities to investigate a community in transition. The film explains why the marsh is changing, illustrates living things and their adaptations to the marsh environment, and asks: what will become of these plants and animals as the marsh continues to fill in?
Color EBF J.

2169. WHAT IS A BIRD? (2 reels, 17 Min.) Describes the ways in which the body structures of birds are adapted for flight, and shows how birds are able to live in a wide variety of environments because of their structural characteristics and behavior. Illustrates behavioral patterns such as nesting, care of the young, and migration. Describes the evolutionary relationships between birds and reptiles.
Color EBF S. C.

2170. PLANT MOTIONS - ROOTS, STEMS, LEAVES (2 reels, 11 Min. Uses time-lapse photography to reveal the phenomenon of "circumnutation," which is the tendency of growing roots, stems, and leaves to describe irregular circles or ellipses. Also demonstrates, by means of several classic experiments, how gravity and light affect plant growth. Color EBF J. S.

2174. WHAT IS A MAMMAL? (2 reels, 14 Min.) Demonstrates the basic structural and behavioral characteristics of mammals and describes their successful adaptation to a wide variety of ecological niches. Compares reptilian and mammalian characteristics, such as reactions to temperature, reproduction, sense organs, and skull structure. Discusses the evolution of mammals, illustrates their variety, and shows their distribution. Color EBF S. C.

2175. EXPLAINING MATTER: MOLECULES IN MOTION (2 reels, 11 Min.) Shows that the rate of molecular movement determines whether matter exists in a solid, liquid, or gaseous state. Explains that because molecular movement is increased by heat and decreased by cold, physical change from one state to another depends upon changes in temperature. Also shows that molecular motion determines the properties of each state. Color EBF J.

2180. EVIDENCE FOR THE ICE AGE (2 reels, 19 Min.) This film studies in detail contrasting features of today's landscapes and then establishes that these features could not result from the conditions and processes that now surround them. Anomalies such as glacial moraine deposits, polished and striated rock, stray boulders, and abondoned drainage channels are explored. By comparing these with the work of modern glaciers, it can be proved that thewe strange geological features were fashioned by sheets of ice that came and went in prehistoric times. Color EBF J.S.A.

2181. WAVES ON WATER (2 reels, 17 Min.) This film explores the manner in which water in a wave really moves. With the help of large experimental tanks, the film explains how waves are created. Wave refraction is described in terms of an earlier analysis of water motion in a wave. The film closes by disclosing startling discoveries regarding high-energy waves that are not produced by wind. Documentary evidence is presented to prove that the seismic sea waves which crossed the Pacific Ocean in 1946 were directly associated with an underwater earthquake near the Aleutian Islands. Color EBF J. S. A.

2184. THE TEMPERATE DECIDUOUS FOREST (2 reels, 17 Min.) Illustrates the complex network of plant and animal relationships that make up the temperate deciduous forest community. Shows typical deciduous forest plants and animals and their adaptations to seasonal change. The full yearly cycle of spring, summer, autumn, and winter is shown through the use of time-lapse, photomicrography, and live photography. Color EBF S. C.

2185. THE GRASSLANDS (2 reels, 17 Min.) This film illustrates the ecological interrelationships of the grasslands biome. Shows the locations of the world's grasslands, explains how they may have originated, and describes their importance as food-producing areas. Demonstrates the dependence of animal life on the dominant plants, the perennial grasses, and gives examples of typical food chains. Color EBF. S. C.

2186. THE GROWTH OF PLANTS (2 reels, 21 Min.) Illustrates the dynamics of the plant growth process, especially as it affects woody plants, and shows how cell division, elongation, and differentiation contribute to stem and root growth. Explains how materials are dispersed throughout the plant and demonstrates the effects of various stimuli, such as hormones, gravity, and light, on plant growth. Color EBF S. C.

2196. ECLIPSES OF THE SUN AND MOON (2 reels, 11 Min.) Stop motion and time-lapse photography are used to bring an actual solar eclipse to the screen in this unique contribution to the study of astronomy. An animation sequence reveals the cause and effect of this dramatic phenomenon - a total solar eclipse. Color EBF J.S.C.A.

2200. MONARCH BUTTERFLY STORY (2 reels, 11 Min.) Indicates the geographical range of the Monarch, shows close-up detail of its form and coloring, and traces the four stages of its life cycle -- egg, larva, chrysalis, and imago. Time-lapse photography shows how the larva hatches from the egg, molts several times, spins its cocoon, and emerges, transformed from a crawling caterpillar into a delicate butterfly. Color EBF J.S.C.

2207. HOW TO MEASURE TIME (2 reels, 11 Min.) This film shows:
Without time, nothing would happen, nothing would change.
Nothing can stop time.
To measure time accurately, you have to count it in some way.
Time can be measured by counting the events of a repetitive action.
A clock is a device that repeats an action over and over again.
There are many kinds of clocks: pendulums, wrist watches, oscilloscopes, etc.
The motion of the earth around the sun measures time in periods of one year. The earth turning on its axis measures time in periods of one day.
Man has a kind of built-in time sense. Color EBF J.

2208. VIBRATIONS (2 reels, 14 Min.) This film shows:
A vibration occurs whenever an action is repeated with a more or less regular rhythm.
Sound is the result of something vibrating.
We can hear sounds produced by rapidly vibrating objects.
We cannot hear sounds produced by objects that vibrate slowly.
It takes a force to start something vibrating.
Every object that vibrates has a natural frequency of vibration.
Two things are needed to produce a vibration: a force that pulls the vibrating object toward a center position, and the natural tendency for a moving object to keep moving. Color EBF J.

2209. LIGHT AND COLOR (2 reels, 14 Min.) This film shows:
LIght and color are related.
White light is made up of many different colors of light.
Objects appear bright if they reflect a lot of light to our eyes.
White objects reflect a lot of light. Dark objects absorb a lot of light.
Color depends on the ability of an object to absorb certain colors and reflect other colors back to our eyes.
Color also depends on the kind of light that is illuminating the object we look at.
Each element, when heated, displays a characteristic set of colors. Scientists use these sets of colors as "finger-prints" to identify elements. Color EBF J.

2210. HOW TO BEND LIGHT (2 reels, 11 Min.) This film shows:
Light travels in straight lines.
Light can be bent: it can be reflected from objects.
Light that is bent continues to travel in straight lines after it is bent.
We can see objects because light hits them and is reflected back to our eyes.
Mirrors can bend and concentrate light.
Light bends when it passes from one material to another -- for example, from air to glass. Prisms can bend light in this way.
Lenses can bend light to magnify objects or to focus images.
Color EBF J.

2211. LIFE STORY OF THE PARAMECIUM (2 reels, 11 min.) Studies the life functions of a typical one-celled animal -- the paramecium -- showing how it feeds, grows, breathes, moves, gives off wastes, reacts to stimuli, and reproduces. Presents the fundamental concept that the basic unit of life is the individual cell. The film serves as an introduction to a study of other groups of animals and plants, showing that higher organisms are composed of many specialized and pendent cells.
Color EBF J.

2212. PLANKTON AND THE OPEN SEA (2 reels, 19 Min.) Demonstrates the importance of the minute plankton organisms to marine food chains. Typical forms of plankton are shown. Photo-micrography and laboratory experiments show how plankton are studied at sea, in floating laboratories, and in shore-based laboratories.
Color EBF S. C.

2213. EVOLUTION OF VASCULAR PLANTS -- THE FERNS (2 reels, 17 Min.) Describes the evolution of vascular systems in land plants. The highly specialized structures that occur in vascular plants are shown through investigation of the fern. Explains the adaptive advantages of vascular systems in land plants, and shows how biologists reconstruct the story of plant evolution by studying fossils and living plants. Color EBF S.C.

2214. PARASITISM (Parasitic Flatworms) (2 reels, 16 Min.) Traces the development of parasitic flatworms, showing several life-cycle stages that have rarely been photographed before. Defines predation, mutualism, internal and external parasitism, and illustrates each of these animal relationships. Reveals complicated life cycle of the blood flukes - and the life cycle of a tape-worm, from man to cow, and back to man. Also shows lung and liver flukes. Color EBF S. C.

2215. THE FISH EMBRYO: FROM FERTILIZATION TO HATCHING (2 reels, 12 Min.) Illustrates how fish eggs are fertilized in a stream, then traces the development of the zygote from the first cell cleavage to the formation of a young fish. Probably the most complete account of fish embryology so far recorded on film.
Color EBF S. C.

2217. ANYONE AT ALL (Safety in the Community) (2 reels, 22 Min.) Presents case histories of three typical accidents to dramatize the message that serious accidents can happen to anyone at all -- on the highway, at home, or at work. Explains how individuals and community groups can promote safety, through teen-age and adult safety councils, city-wide campaigns, and special courses in driver training and safety education. B/W EBF J.S.A.

2221. MAMMALS ARE INTERESTING (2 reels, 12 Min.) Describes the distinguishing characteristics of mammals. Includes close-up views of some forty different animals -- from the one-celled protozoa to the highly intelligent chimpanzee. Points out the differences between vertebrates and invertebrates, cold-blooded and warm-blooded animals; and classifies several other plant eaters, the carnivores, the rodents, and the primates. Color EBF J.

2223. THE CAVE COMMUNITY (2 reels, 13 Min.) Illustrates how the study of plant and animal life in the unusual and relatively unchanging environment of the cave community provides biologists with important data for understanding some of the mechanisms of adaption and evolution of species. Shows the bats, fish, salamanders, and insects. Color EBF S.G.

2225. ORIGIN OF LAND PLANTS -- LIVERWORTS AND MOSSES (2 reels, 14 Min.) Traces the evolution of land plants and illustrates the structural characteristics, reproductive processes, and adaptive mechanisms of liverworts and mosses. Shows their relationship to the development of higher land plants. Photo-micrography, macrophotography, and animated drawings are used to illustrate the adaptive and reproductive processes. Color EBF S. C.

2226. DISTRIBUTION OF PLANTS AND ANIMALS (2 reels, 16 Min.) Defines and illustrates the factors that determine how plants and animals are distributed throughout the world. With detailed distribution maps, explains how the dispersal of any species of plant or animal is limited by its rate of increase, its ability to disperse, and its ability to surmount physical and biological barriers. Color EBF S. C.

2227. THE DESERT COMMUNITY (2 reels, 12 Min.) As part of the unit on plant and animal relationships, "The Desert Community" studies a ground squirrel to discover adaptations of this animal to accommddate the desert's extremes of temperature and dryness. The abundance of light in the desert and the scarcity of moisture provide clear-cut examples of the need for adaptations to extreme physical conditions. Color EBF J.

2231. FRONTIERS IN SPACE (Exploring the Universe With Telescopes) (2 reels, 11 Min.) Explains how astronomers use optical and radio telescopes to gather information about the universe. Describes how reflecting and refracting telescopes work, and shows the world's largest reflecting telescope, the Hale telescope at the Palomar Observatory, in operation. Discusses the methods used by astronomers to obtain and analyze data about the stars. Color EBF J.S.

2233. TOBACCO AND THE HUMAN BODY (2 reels, 15 Min.) An authentic report on the scientific results of modern research, evaluating the effects of the use of tobacco. Analyzes the contents of tobacco smoke, demonstrates some of the physiological effects of smoking, and sums up the factors to be considered in deciding whether or not to smoke. B/W EBF J.S.A.

2236. DRUG ADDICTION (2 reels, 22 Min.) Tells the story of the hazards of narcotic drugs. Depicts with stark realism many phases of this problem, particularly as it affects high school youth. Explains the derivation of heroin, marijuana, and cocaine, and employs animated drawings to describe their physiological effects. Notes the connection between drug addiction and crime. B/W EBF J.S.A.

2237. MAGNETIC, ELECTRIC, AND GRAVITATIONAL FIELDS (2 reels, 11 Min.) -- This film shows:
A region of space where at every point a force can be felt is a field.
A magnetic field is the area around a magnet where its magnetic force can be felt.
Although fields cannot be seen, we can observe the effects they have on objects.
An electric field surrounds an object that has an electric charge.
Fields extend out in all directions from their sources.
There is a gravitational field around all objects.
A gravitational field extends out from the earth in all directions.
The farther from the source of a field, the weaker the field.
The gravitational field around the earth attracts objects toward the center of the earth. Color EBF J.

2238. HOW TO PRODUCE ELECTRIC CURRENT WITH MAGNETS (2 reels, 11 Min.) -- This film shows:
Electricity and magnetism are closely related.
An electric current can produce a magnetic effect.
If an iron core is placed inside a coil of wire and electric charges flow through the wire, a magnetic effect is produced.
The device is called an electromagnet.
Electromagnets can attract iron and steel.
Magnets can be made to produce electric currents.
When permanent magnets are moved in relation to a coil of wire, electric current flows in the wire.
An electromagnet can produce an electric current in a nearby coil simply by being turned on and off.
Electric current can be produced either by moving coils in relation to magnets or magnets in relation to coils.
Machines that move magnets and coils to produce electric current are called generators. Color EBF J.

2239. WHAT IS ELECTRIC CURRENT? (2 reels, 14 Min.) -- This film shows:
Electric current has many uses: it produces light, heat, and power.
House current is dangerous.
There is an electric current only when electricity has a complete circuit to flow through.
The flow of electricity through wires is in some ways similar to the flow of water through pipes.
Electricity can flow in either direction through a circuit.
When there is an electric current, whatever it is that flows is already in the wires.
The "stuff" in wires that can flow is called electric charge.
When something pushes electric charges and makes them flow, there is an electric current.
Electric charges are in all materials.
Batteries and generators act rather like pumps that make electric charges flow. Color EBF J.

2240. WHAT IS UNIFORM MOTION? (2 reels, 14 Min.) -- This film shows:
When an object is moving at a constant speed in a straight line, it is moving with uniform motion.
Objects traveling with a uniform motion travel equal distances in equal times.

It takes a force to start something moving, and it takes a force to slow or stop a moving object.
Once an object is moving, it has a tendency to keep moving.
Friction is a force that slows down many moving objects.
Lubrication is often used to reduce friction.
The natural way for a moving object to move, if no forces are acting upon it, is with a uniform motion. Color EBF J.

2249. THE SCIENTIFIC METHOD (2 reels, 12 Min.) Explains the steps of the scientific method, demonstrates the way this method of problem solving is applied by scientists, and discusses the value of scientific thinking in dealing with problems of everyday life. Features the discovery of penicillin by Sir Alexander Fleming. Color EBF J.S.

2250. INTRODUCTION TO BIOLOGY (2 reels, 14 Min.) Provides an excellent overview of biology as a means of understanding ourselves and becoming better acquainted with our biological environment. Describes the life processes and depicts ways in which biology is applied to such problems as combating disease and controlling insect pests. B/W EBF J.S.

2251. FIRE PREVENTION (In the Home) (2 reels, 14 Min.) Points out the importance of a periodic fire safety check in every home and demonstrates an efficient plan of inspection, with special attention to danger spots in attics and basements. Stresses the desirability of making fire prevention a family matter in which parents and children cooperate in detecting and removing fire hazards. B/W EBF J.

2255. UNDERSTANDING VITAMINS (2 reels, 14 Min.) Explains what vitamins are, how they work, and why they are necessary for good health. Points out natural sources of important vitamins, and reveals the effects on body tissues of a diet lacking in certain vitamins. Re-creates major events in the discovery of vitamins and calls attention to present-day research. Color EBF J.S.A.

2256. LIFE IN THE GRASSLANDS (North America) (2 reels, 11 Min.) Presents a picture of grassland ecology, indicating adaptations of indigenous plants and animals. Shows how various animals escape natural enemies -- by protective coloration (birds), by burrowing (prairie dogs), by outrunning their pursuers (antelope). Describes the struggle to find food; differentiates between grass-eating and flesh-eating species; and gives an example of three mutually interdependent life-forms -- the cowbird, the tick, and the buffalo. Color EBF J.S.A.

2258. HEALTH IN OUR COMMUNITY (2 reels, 14 Min.) Dramatizes the work of the Department of Health -- both the everyday activities required to safeguard the community and the crises that result from the outbreak of a dangerous disease. The film stresses the teamwork that exists at all times between public health personnel and private medical people in dealing with community health problems: unsanitary living conditions, industrial hazards, accidents, contagious disease, and the danger of contaminated foods. Color EBF J.

2260. ROCKETS: HOW THEY WORK (2 reels, 16 Min.) With animated models and drawings, the film shows how rockets achieve motion and compares rocket power with other types of motive power. Dramatic scenes at a rocket launching site cover the count down procedure and the take-off of a giant multi-stage rocket. Demonstrates the principles of rocket propulsion, fuels, and rocket engines; multiple-stage rockets, and guidance systems. Illustrates the basic scientific techniques on which the modern use of rockets is based. B/W EBF J.S.A.

2266. HOW NATURE PROTECTS ANIMALS (Second Edition) (2 reels, 11 Min.) Illustrates typical defensive adaptations of animals to natural hazards. Shows a wide variety of animal adaptations for running, swimming, climbing, and flying, and demonstrates how protective coloration serves to conceal some animals from enemies. Live close-up photography is used to illustrate basic concepts of animal adaptations to their environment. Color EBF J.

2268. BEACH AND SEA ANIMALS (Second Edition) (2 reels, 11 Min.) Illustrates and explains the characteristics and importance of invertebrate animals living on or near the beach. Shows the body plan, adaptations, and interrelationships of a wide variety of beach and sea animals, such as the starfish, sea urchin, crab, octupus, lobster, sponge, anemone, and nudibranch. Basic concepts of marine life are demonstrated through the use of close-up underwater photography. Color EBF J.S.C.

2269. PREFACE TO PHYSICS (2 reels, 15 Min.) Designed especially to preview important aspects of physics and stimulate beginners to greater interest in this subject area. Historical settings, modern laboratory scenes and animated drawings invest this science film with an exceptional degree of educational impact. Color EBF J.S.

2273. THE STRANDS GROW (2 reels, 15 Min.) Uses fossil remains and other prehistoric relics to show that communities of plants and animals have existed on earth only to be replaced by others when they have failed to adjust themselves to changes in their environment. The growth and development of the climax forest is shown in detail to emphasize the meaning of a state of balance in nature. Color EBF J. S. A.

2287. PREFACE TO CHEMISTRY (2 reels, 17 Min.) An introduction that provides a brief description of our chemical herritage including the work of Priestley and Lavosier. Introduces three basic areas of chemistry -- inorganic, organic, and physical -- and shows how these lead to applications that are widely beneficial. Portrays interesting experiments concerning chemical change, electrolysis, conductivity, and analysis. Describes how the work of modern chemists contributes to a higher standard of living. Color EBF J.S.

2291. FACE OF THE EARTH (2 reels, 12 Min.) Reveals the "wearing down" forces on earth in the action of glaciers, frost, landslides, and running water. In contrast are the "building up" forces demonstrated by volcanic lava and buried sea shell fossils in the rock layers. Portrays the Painted Desert, the Petrified Forest, and the Grand Canyon, Zion and Bryce Canyons as illustrations of spectacular geologic formations resulting from the unceasing war between the forces of nature. Color EBF J.S.A.

2293. SYNTHETIC FIBERS - NYLON AND RAYON (2 reels, 14 Min.) Reveals how modern science and technology have made possible the development of new artificial fibers for making textiles -- specifically rayon and nylon. Portrays some of the processes used in making these fibers, and some of the ways in which they are useful to man. B/W EBF J.

2295. ALCOHOL AND THE HUMAN BODY (2 reels, 14 Min.) Explains the specific effects of ethyl alcohol on the human body. Describes how alcohol is made and its characteristics. Traces the course of alcohol through the body until it either oxidizes or escapes, and shows the effects of alcohol on the brain. Dramatizes the case of a problem drinker, including a treatment. B/W EBF J.S.C.A.

2297. A STRAND BREAKS (2 reels, 17 Min.) Illustrates the importance of maintaining the natural balance of plant and animal life in an ecological community by showing what happens when that balance is destroyed. Shows how overgrazing affects the grasslands community and how hunting can affect the balance of the forest community. Explains how man can preserve the balance in nature by intelligent management of natural resources. Color EBF J.S.A.

2299. NATURAL SELECTION (2 reels, 16 Min.) Presents a fascinating report on three important experiments concerning the role of natural selection in evolution: at Oxford University, a study of bird predation as a factor in the survial of variant species of moths; at Carnegie Institute, a study of natural selection among plant populations; and at the University of Western Ontario, a program to investigate the development of resistance among mosquitoes to modern insecticides. Color EBF S. C.

2300. POPULATION ECOLOGY (2 reels, 19 Min.) Analyzes the biological principles of environment as they relate to surplus or decline of births over deaths. Conditions are set up in the laboratory in which the surplus of births develops in a predictable pattern when natural enemies, food factors, and other environmental influences favor such a surplus. Man, with his ability to change invironment, has created a problem of birth surplus over number of deaths, giving rise to a biological and sociological phenominon which we call population explosion. Color EBF S. C

2305. SPIDERS (Second Edition) (2 reels, 11 Min). Illustrates the distinctive characteristics and habits of spiders, as contrasted with insects; presents striking close-ups of spiders spinning their webs and egg sacs, of spider eggs hatching, important stages in the development of the young, and the methods various spiders use in hunting or trapping insects. Representative types included are: the marbled spider, the golden garden spider, the black widow, the common garden spider, the wolf spider, the diving spider, and the tarantula. Color EBF J.S.

2308. LIGHT AND POWER (2 reels, 16 Min.) Reveals highlights in the history of man's efforts to harness the powers of electricity, and emphasizes the need for constructive uses of continuing discoveries in electricity. B/W EBF J.S.A.

2311. IMPROVING STRAINS OF LIVESTOCK (Applications of Genetic Principles) (2 reels, 13 Min.) Essential procedures in improving strains of livestock are shown in operation at an up-to-date breeding farm. Techniques of selecting parent stock are described, and examples of inbreeding and outbreeding shown. The pioneering roles of Robert Bakewell and Gregor Mendel are identified. This film was formerly titled "Animal Breeding." B/W, EBF J.S.

2329. IONIZATION (1 3/4 reels, 18½ Min.) The theory of ionization is treated with emphasis on its present important status in chemistry. The theory is defined, and we see the identifying characteristics of ions and where they occur. Electrolytes, dissociation, solvents, electrovalent compounds and covalent compounds are shown by animation and laboratory demonstration. In conclusion, reference is made to important applications of ionization in industrial chemistry. Color COR S. C.

2330. SIMPLE PLANTS: BACTERIA (2 reels, 13½ Min.) Bacteria and the science of bacteriology are studied with reference to the major characteristics of bacteria, useful and harmful varieties, growing bacteria colonies, checking bacterial growth, and the use of antibiotics. Photomicrography reveals the three known groups -- spiral, rod-shaped, and spherical bacteria -- the bacterial digestive process, and the nature of enzymes. Color COR J.S.C.

2334. GRASSHOPPER: ANATOMY AND DISSECTION (2 reels, 13½ Min.) Extreme close-up views and step-by-step dissection show in detail the external and internal anatomy of the lubber grasshopper. The digestive, circulatory, excretory, nervous, respiratory and reproductive systems are traced in the insect and on matching anatomical diagrams. Natural habitat scenes relate the structures to their functions. Color COR J.S.C.

2338. HUMAN BODY, THE: REPRODUCTIVE SYSTEM (2 reels, 13½ Min.) Through animation and photomicrography, including fertilization of a human ovum, the film presents a clear and objective description of the human reproduction system. It shows similarities and differences between male and female reproductive organs, locates them in the body, and describes the specific functions of each in the creation of new life. (It is recommended that this film be shown to boys and girls in separate groups.) Color COR J.S.C.

2341. ADAPTATIONS OF PLANTS AND ANIMALS (2 reels, 13½ Min.) Examples illustrate the adaptations of living things to environment, for food-getting, and for protection. Directed observation of a variety of plants and animals leads pupils to an awareness of the principle of adaptation so important to survival. Color COR J.

2344. PHOTOSYNTHESIS: CHEMISTRY OF FOOD-MAKING (2 reels, 13½ Min.) The fundamental process of photosynthesis is thoroughly investigated in this film. Products of photosynthesis are shown experimentally to include glucose and oxygen. The film traces the process by which light energy is converted to chemical energy in the presence of the compound ATP, and molecules of carbon dioxide and water are rearranged to form the basic unit of the glucose molecule. Color COR J.S.

2345. HUMAN BODY, THE: NUTRITION AND METABOLISM (2 reels, 13½ Min.) This film distinguishes between basal metabolism and active metabolism and expresses the energy requirements of metabolism in the units of calories. The film discusses the five classes of chemical substances which comprise all natural foods -- carbohydrates, fats, proteins, vitamins, and minerals -- and explains the basic chemistry by which they supply our bodies with energy and essential chemicals needed for growth and repair. Color COR J. S. C.

2349. PROTOZOA: STRUCTURES AND LIFE FUNCTIONS (2 reels, 16 Min.) Living specimens of the four classes of protozoa -- rhizopods, flagellates, ciliates, and sporozoans -- are examined in photomicrography and in unique glass models. Special scenes under a light-interference microscope show the diversity of structural adaptations which equip these animals to carry on the life functions of movement, food-getting, growth, reproduction, and response to stimuli, in the variety of moist environments. Color COR J. S. C.

2351. HUMAN BODY, THE: RESPIRATORY SYSTEM (2 reels, 13½ Min) This film locates and describes the organs of the respiratory system, and shows in animation and live demonstration the mechanics of ventilation and the physics of diffusion between alveoli and capillaries. We see the effect on the respiratory system of varying needs for oxygen, and the function of the respiratory system in providing needed oxygen and eliminating carbon dioxide. Color COR J. S. C.

2362. GENETICS: MENDEL'S LAWS (2 reels, 13½ Min.) Scenes photographed in Gregor Mendel's own garden in Brno, Czechoslovakia, add authenticity to this presentation of the original work with pea plants, which has become the basis of the present science of genetics. The film duplicates some of Mendel's experiments, and clearly explains his laws of Dominance, Segregation, and Independent Assortment. Later work by DeVries, Correns, Morgan, and Muller is also described. Color COR J. S. C.

2364. HUMAN BODY, THE: CIRCULATORY SYSTEM (2 reels, 13½ Min.) The entire circulatory system is analyzed by means of animation, cinefluorography, drawings, and close-ups of live organs. Included are the heart, lungs, and kidneys; the processes of the circulatory system; and the network of arteries and veins that carry blood throughout the body. Color COR J. S. C.

2370. SIMPLE DEMONSTRATIONS WITH WATER (2 reels, 13½ Min.) Water has surface tension; water exerts pressure; and water can produce a buoyant force. Deftly and clearly performed demonstrations of these three basic principles will help us learn more about water and the way it behaves. Many of these simple demonstrations can be repeated in the classroom. Color COR J.

2372. COLLOIDAL STATE, THE (2 reels, 16 Min.) The products of colloidal matter are of major significance in a multitude of chemical processes. This film introduces us to the colloidal state through a series of carefully controlled laboratory experiments and demonstrations. It defines colloids, and their several kinds, shows how they differ from solutions and suspensions, how they may be prepared and destroyed. Color COR S. C.

2373. METALS AND NON-METALS (Second Edition) (2 reels, 13½ Min.) Differences in the physical properties of metals and non-metals are shown in this film to be related to the tendency of metals to lose electrons, while non-metals tend to gain electrons. The film explains the chemical properties and the positions of these two groups in the periodic table, and illustrates closest-packing of atoms in metals. B/W COR J. S.

2378. GENETICS: IMPROVING PLANTS AND ANIMALS (2 reels, 13½ Min.) Four methods which geneticists use to control the heredity of plants and animals are clearly illustrated: the techniques of inbreeding, hybridizing, development of desired mutations, and increasing the number of chromosomes. Their effect on improving size, taste color, hardiness, and other desired characteristics is shown in scenes filmed in the laboratory, the green-house, and on experimental farms.
Color COR J. S. C.

2379. HUMAN BODY, THE: NERVOUS SYSTEM (2 reels, 13½ Min.) This film study of the nervous system exphasizes the basic functions of the system, its main organs, the various neurons of which these organs are composed, and the principal areas of the brain. Microscopic views of the nerve tissue, a specimen of a human brain, animation and anatomical charts will help students to visualize this complex system and gain a better understanding of its control of the body processes.
Color COR J. S.

2380. HUMAN BODY, THE: EXCRETORY SYSTEM (2 reels, 13½ Min.) A step-by-step study of the structure and functions of the excretory system is presented. The main organs of the system, the kidneys, are explained in detail. We learn that through the processes of filtration of wastes, and the re-absorption of nutrients, the kidneys carry on their main function -- regulation of the composition of blood. The role of the skin in removing water from the body is also discussed. Color COR J. S. C.

2383. ACIDS, BASES, AND SALTS (2 reels, 21 Min.) Briefly surveying the early theories of Arrhenius and later theories of Bronsted and Lowry, and Lewis, the film uses the Arrhenius or classical definition of acids, bases, and salts to explore the properties and use of the important chemical compounds whose water solutions contain ions. We are shown the important properties of an acid, a salt, and a base; household and industrial uses of each and the ways in which they are prepared commercially and in the chemistry laboratory. Color COR S. C.

2384. POSITIVE AND NEGATIVE NUMBERS (2 reels, 16 Min.) Movement of play on a football field is visualized on a number line to show the need for enlarging the numbers of arithmetic to include the system of positive and negative numbers. The directional concept of signed numbers and rules for basic operations with them are illustrated with changing temperature on a thermometer and time-rate distance problems along a railroad line. B/W COR J.

2385. GEOMETRY: INDUCTIVE AND DEDUCTIVE REASONING (2 reels, 13½ Min.) This film defines and illustrates the processes of in-ductive and deductive reasoning as they are used in the study of geometry. Also included is a brief review, beginning with the ancient Greeks, of the history of formal reasoning in science and mathematics, and something of its application in these fields today. B/W COR S. C.

2395. PLANT-ANIMAL COMMUNITIES: INTERRELATIONSHIPS (2 reels, 13½ Min.) Basic to the study of ecology is an understanding of the two major kinds of interrelationships among living things -- symbosis and antagonism. The pattern of life in any biome is intricately involved in these interesting partnerships. From a wide variety of biomes, this film details examples of mutualism, commensalism, antiobiosis, exploitation, parasitism, competition, and predation. Color COR J. S.

2397. SOLUTIONS (2 reels, 16 Min.) The more important characteristics of solutions are presented by means of laboratory demonstrations. Solutions are defined, both ionic, and nonionic, and the common types visualized. We learn of the factors which influence solubility such as temperature, pressure, and composition, and, in conclu-ion, see some of the practical applications of solutions in the chemistry of everyday life. Color COR C. S.

2400. SIMPLE MACHINES: WORK AND MECHANICAL ADVANTAGE (2 reels, 13½ Min.) Pointing out that complex machines are combinations of simple machines, the six simple machines are shown to be variations of two basic ones: the lever, from which the pulley and wheel and axle are derived, and the inclined plane, from which the screw and wedge are derived. How each machine multiplies force or trades force for distance is described quantitatively in terms of work and mechanical advantage. B/W COR J. S.

2402. CELL BIOLOGY: LIFE FUNCTIONS (2 reels, 19 Min.) This film investigates the chemical and physical processes in the living cell which provide a basis for the life functions. Diffusion and osmosis in food-getting, and the production of energy for growth, reproduction, movement, and digestion, through hydrolysis and oxidation of nutrients are clearly outlined. Chemical reactions involving enzymes, DNA, RNA, ATP, and ADP are visualized with animated geometric figures which clarify this complex organic chemistry. Color COR J. S. C.

2403. CELL BIOLOGY: STRUCTURE AND COMPOSITION (2 reels, 13½ Min.) The intricate structure of the cell is explored through photomicrography, electron, micrographs, and models. The colloidal substance traditionally known as protoplasm is analyzed, and we learn that this living matter is specialized into the cell membrane, cytoplasm, nucleus, chromosomes, endoplasmic reticulm and other structures of the cell. The interaction of these and other structures enables the cell to perform all the life functions. Color COR J. S. C.

2404. SPACE, SCIENCE: THE PLANETS (2 reels, 16 Min.) Telescopic motion pictures, animation, and other special effects survey the nine planets and their satellites. The film shows how we learn about the planets and provides information about their temperatures and atmospheres, periods of rotation and revolution, and the distance of each plane from the sun. The film also shows that instruments launched into space are adding to our information about the planets. B/W COR J. S.

2410. LANGUAGE OF GRAPHS, THE (2 reels; 13½ Min.) Types of graphs, their uses, and values are presented here to help students understand and appreciate graphs in presenting statistical data. Bar, Line, circle, and equation graphs are woven into a story to show how these and other graphic representations can be used. Color COR J. S.

2411. CHEMICAL CHANGES ALL ABOUT US (2 reels, 13½ Min.) Chemical changes are taking place around us every day. We see that when chemical changes occur, substances form new substances, and energy is either used, or given off. The film explains atoms and molecules, elements, mixutres, and compounds, and illustrates many familiar chemical changes such as oxidation, photosynthesis, and digestion. Color COR J.

2414. INVERTEBRATES, THE (2 reels, 13½ Min.) Presenting the animals without backbones in their major classifications, this film shows typical examples of protozoa, sponges, coelenterates, worms, echinoderms, mollusks, and arthopods. The distinguishing characteristics of each group are described and illustrated through photomicrography and other special film demonstrations. Color COR J. S.

2415. SIMPLE PLANTS: ALGAE AND FUNGI (2 reels, 13½ Min.) This film describes the major characteristics of simple plants and shows they differ from higher plants. Excellent nature-photography reveals natural habitats, and the major differences between algae and fungi ane explained. The diverse human uses of algae and fungi are explored. Color COR J. S. C.

2423. THE JOINTED-LEGGED ANIMALS - ARTHROPODS (2 reels, 19 Min.) Illustrates the structural and functional characteristics of animals in the phylum Arthopoda, provides examples from each of the five classes, and describes their evolutionary development. The processes of metamorphosis and moulting are illustrated using photomicrography and time-lapse photography. The economic importance of arthropods to man is discussed. Color EBF S. C.

2427. CELL BIOLOGY: MITOSIS AND DNA (1½ reels, 16 Min.) The nearly endless number of arrangements of nucleotides within the DNA molecule account for the differences between individuals, as well as fo. those between species. Models illustrate the structure of the DNA molecule and its duplication prior to cell division. Cinemicroscopy of the division of a living cell, supplemented by animation, illustrates, step-by-step, the five stages of the mitotic process. Included is a short explanation of meiosis. Color COR J. S. C.

2431. EARTH, THE: ITS OCEANS (1¼ reels, 13½ Min.) A comprehensive study of a scientific area of growing importance is presented in a clear, easily understood manner. This film reveals the changing pattern of the ocean's surface, the living and non-living things in the waters, the nature of the ocean floor, and the influence of the oceans upon man. The roles of modern scientists - oceanographers, and marine biologists, and others - are shown as they work to gain more knowledge of the earth's vast, deep oceans. Color COR J.

2436. CHEMICAL BOND AND ATOMIC STRUCTURE (1½ reels, 16 Min.) This film discusses the structure of the atom and shows that the electrons in the outermost shell, or energy level, of an atom help determine the way in which it bonds chemically with other atoms. Animation and laboratory demonstrations show three types of chemical bond and explains how bonding affects the physical and chemical properties of a substance. Color COR S. C.

2437. REPRODUCTION IN PLANTS (1½ reels, 13½ Min.) This film shows the difference between sexual and asexual reproduction of plants. Further explained are the processes involved in each method of reproduction, self-pollination, cross-pollination, and ways plant strains are improved by selective breeding illustrate applications of principles of plant reproduction. Color COR J. S.

2443. ALGEBRA: A WAY OF THINKING ABOUT NUMBERS (Second Edition of Algebra In Everyday Life) (1½ reels, 13½ Min.) Pointing out that algebra is a continuation of arithmetic and that all the rules of arithmetic apply in algebra, this film shows how mathematical statements are translated into algebraic terms and expressions. We see how the basic tools of equations and inequalities to show relationships between numbers can be used to solve many different kinds of problems. B/W COR J. S.

2453. A TRIP TO THE PLANETS (2 reels, 15 Min.) Illustrates an imaginary trip to the planets, based on the most recent scientific facts about the solar system. Model photography and animation have been combined to examine the composition and structure of our solar system; the motions of the planets, comets, and asteroids; and the forces which keep the planets in motion. Also reveals the size and appearance of the planets, their surface conditions as scientists imagine them to be, and explains how the sun produces its enormous energy. Color EBF J. A.

2454. ORIGINS OF WEATHER (2 reels, 13 Min.) Live photography and colorful animation sequences explain how the earth is protected from extremes of heat and cold by the thin layer of atmosphere surrounding it. Shows how the sun's heat is distributed by moving masses of air and how the activities of cold and warm fronts produce constantly changing weather conditions over the surface of the earth. Color EBF J. A.

2458. WHAT PLANTS NEED FOR GROWTH (2 reels, 11 Min.) Makes effective use of time-lapse photography and revealing close-ups to give children a new appreciation of the marvels of plant growth. Simple laboratory experiments are performed to illustrate the basic needs of plants -- for water, light, minerals, air and warmth -- and to show how plants react to favorable and unfavorable conditions. Children are encouraged to set up similar experiments and to care for plants of their own. Color EBF J.

2459. GLASS - FROM THE OLD TO THE NEW THROUGH RESEARCH (2 reels, 20 Min.) Demonstrates the important role of glass in modern life and how man's ingenuity and ability to utilize research has led to better products. Provides insight into the techniques of glass manufacturing as well as modern methods of product development. Identifies major types of glass, and shows various glass products being made. Color EBF J. S, A. C.

2464. HUMAN BODY, THE DIGESTIVE SYSTEM (1½ reels, 13½ Min.) Animation, X-ray, and live action scenes of the major digestive organs give detailed account of the function of this system -- to break down chemically the complex nutrients, carbohydrates, proteins, and fats into simple food materials. The roles played by the salivary glands, esophagus, stomach, pancreas, liver, gall bladder, and small and large intentines are clearly defined and related to each other. Color COR J. S. C.

2465. AGE OF ENLIGHTEMENT IN EUROPE, THE (1¼ reels, 13½ Min.) Applying science to the physical world, Copernicus, Kepler, Galileo and Newton demonstrated that the universe operates according to natural laws which could be discovered by reason. Applying reason to the affairs of men, Locke, Montesquieu, Voltaire, Rousseau, and Diderot put forth ideas of democracy, freedom and equality. These ideals were translated into action as the American and French Revolutions. B/W COR S. C.

2469. ALCOHOLISM (2 reels, 22 Min.) Presents some causes of excessive drinking, tracing the development of the disorder in the case history of one man. Shows how the roots of alcoholism are imbedded in personality difficulties, and describes various forms of treatment. Demonstrates the role of the public clinic, and emphasizes the need for increased treatment facilities and greater public knowledge. B/W EBF J. S. A.

2470. ARISTOTLE AND THE SCIENTIFIC METHOD (1¼ reels, 13½ Min.) Against a background of the achievements of science in the ancient world, the film stresses Aristotle's contribution to the development of the scientific method. Departing from Plato's ideas, Aristotle made observations based on his experience, classified his data, performed experiments, and sought to arrive at generalizations or principles. The film illustrates how his work laid the foundations for such sciences as botany and zoology. Color COR J. S.

2474. HUMAN BODY, THE: MUSCULAR SYSTEM (1¼ reels, 13½ Min.) This film looks at the three types of muscle which make up the human musculature system. The structure and function of voluntary muscle tissue is explained in detail, using photomicrography, models, and animation. Laboratory demonstration illustrates the role of the nerve impulse in muscular contraction. The film also explains the role of ATP in the complex chemical process of muscular movement. Color COR J. S. C.

2486. SPACE SCIENCE: AN INTRO
Introducing the new vocabulary of space travel, live action, a specially designed model, and animation to show how speed and direction determine whether a space vehicle will go into orbit, fall back to earth, or escape the earth. Terms such as thrust and acceleration are explained; g-forces and zero gravity conditions demonstrated; and satellite orbits are shown.
B/W COR J.

2490. READING WEATHER MAPS (1¼ reels, 13½ min.)
Step-by-step preparation of a station model includes symbols for cloud coverage, wind direction and speed, dew point, and barometric pressure and tendency. Based on hundreds of station models in North America we see isobars, low and high pressure areas, warm and cold fronts, and areas of precipitation added to complete the weather map. We see how the weather map may be used to forecast weather.
B/W COR J.

2509. FLOWERING PLANTS AND THEIR PARTS (16 min.)
Color (EBF) G. J. S. C.

2510. A STORY OF DISCOVERY (Why Plants Bend Toward Light)
Replicates experiments performed by Darwin and later scientists to illustrate an historical approach to experimentation, giving students an insight into scientific methods. The question posed, "Why do plants bend toward the light" is a vehicle for presenting the experimental process, as well as for posing other problems which have as yet not been answered.
(13 min.) Color (EBF) G. J.

2518. IN THE NAME OF HUMANITY
This is a comparison of State Institutions for mentally retarded in Minnesota with those in England, Norway, and Sweden. It shows the use of small group living and learning situations that have proven to provide better end results from the economical standpoint. This film is a must to see in order to find out the needs of Minnesota's mentally retarded.

2522. HUMAN AND ANIMAL BEGINNINGS (17 min.)
The Concepts and Information Include:
1. How all animal life begins.
2. The Birth process, including prenatal growth and development
3. Aspects of Infancy & Baby Care.

2523. GIRL TO WOMAN (16 min.)
An important film for girls dealing with human growth and development during the turbulent change from girlhood to womanhood. Describes the male reproductive system as well as that of the female. A scientifi and authoritative treatment of a sensitive subject, produced under medical and psychiatric supervision. A companion film to BOY TO MAN.
Color (HN) G. J. S.

2524. BOY TO MAN (16 min.)
An important and sensitive film for boys, dealing candidly with the secondary and primary sexual changes in the male. A scientific and authoritative treatment of a difficult subject, produced under medical and psychiatric supervision. Color (HN) G. J. S.

2525. DO UNTO OTHERS
Donated by - Montevideo March of Dimes Chapter
15 minutes in length B/W

2526. BRIDGE BETWEEN
Donated - Montevidec March of Dimes Chapter
(13 min.) B/W

2527. SPONGE - TREASURE FROM THE SEA (14 min.)
The story of the natural sponge industry of Tarpon Springs, Fla. Underwater sequences show "hard hat diving for sponges." The "silent" sponge auction, the "Blessing of the waters" and the dive for the Golden Cross are among the colorful events depicted. The picture also contains information on the biology and uses of natural sponge. Deposited by - U. S. Department of the Interior color

2528. THE STORY OF MANHADEN (20 Min.)
The story of the manhaden fishery, one of the oldest and largest fisheries in the United States; showing the uses, methods of capture and processing of the fish. color
Deposited by - U. S. Department of the Interior

2529. HUMAN GROWTH (20 min.)
The film creates an instructional atmosphere that permits the facts of human sex to be discussed without embarrassment or tension.

The film achieves three cardinal objectives:
1. It demonstrates for parents how sex education can be handled smoothly, intelligently, and in a socially acceptable manner in schools.
2. It provides the classroom teacher with a suitable instructional aid for presenting the biological facts of sex as a part of human growth and development.
3. It establishes, through identification, an exemplary teacher-pupil relationship conducive to easy classroom discussion. Color HN G.

2532/ INSIGHT OR INSANITY? (18 min.)
To document the dangers in the unsupervised, capricious use of LSD
To explain what medical sciences know of the physiologic and psychologi actions of LSD.
To counteract a few of the fantastic and erroneous claims made for the use of LSD.
To enumerate some of the facts that are unknown about the actions and possible consequences of LSD.

4001. A & B. PHYSICS, AN EXACT SCIENCE (3 reels, 30 Min.) Surveys the various branches of physics usually covered in a one year course and demonstrates each. B/W (EBF) S. C.

4002. A & B. OPTICAL ILLUSIONS (3 reels, 30 Min.) Compares and demonstrates subjective and objective methods of measurement, principally through optical illusions. Color (EBF) S. C.

4003. A. & B. UNITS OF MEASUREMENT (3 reels, 30 Min.) Defines and demonstrates fundamental and derived units of measurement. B/W (EBF) S. C.

4004. A & B. MEASUREMENT OF DISTANCES AND ANGLES (LABORATORY) (3 reels, 30 Min.) Illustrates use of the metric system and demonstrates measurement of lines and angles. B/W (EBF) S. C.

4005. SPEED AND VELOCITY (3 reels, 30 Min.) Introduces velocity, and instantaneous velocity. B/W (EBF) S. C.

4006. SPEED AND VELOCITY (LABORATORY) (3 reels, 30 Min.) Distance and time measurements on small car and train. Data recorded. B/W (EBF) S. C.

4007. ACCELERATED MOTION (3 reels, 30 Min.) Provides formulas and demonstration experiments illustrating uniformly accelerated motion. B/W (EBF) S. C.

4008. ACCELERATED MOTION (LABORATORY) (3 reels, 30 Min.) Steel ball rolls down incline plane. Measurements made and data recorded. B/W (EBF) S. C.

4009. COMPOSITION OF VELOCITIES (3 reels, 30 Min.) Demonstrates vector aspects of velocity by considering simultaneous velocities. B/W (EBF) S. C.

4010. RESOLUTION OF VELOCITIES (3 reels, 30 Min.) Velocity as a vector quantity is resolved into two components. Demonstration model used. B/W (EBF) S. C.

4011. FALLING BODIES (3 reels, 30 Min.) Kinematics of freely falling bodies treated. Demonstrations of falling bodies in vacuum and in air. B/W (EBF) S. C.

4012. FALLING BODIES (LABORATORY) (3 reels, 30 Min.) Measures time and distances for freely falling bodies with high precision. B/W (EBF) S. C.

4013. NEWTON'S FIRST LAW OF MOTION (3 reels, 30 Min.) Demonstration experiments to illustrate concepts of inertia. B/W (EBF) S. C.

4014. PROJECTILES (3 reels, 30 Min.) Demonstrates laws relating to projectiles. Vertical and horizontal projection treated in detail. B/W (EBF) S. C.

4015. PROJECTILES (LABORATORY) (3 reels, 30 Min.) Heights and ranges of projectiles are measured for different elevation angles. For class participation. B/W (EBF) S. C.

4016. NEWTON'S SECOND LAW OF MOTION (3 reels, 30 Min.) Uniformly accelerated motion demonstrated by small car. Kinematics of motion given. B/W (EBF) S. C.

4017. THE FORCE EQUATION (LABORATORY) (3 reels, 30 Min.) Acceleration of small car measured. For class participation. B/W (EBF) S. C.

4018. NEWTON'S LAW OF GRAVITATION AND THIRD LAW OF MOTION (3 reels, 30 Min.) Formulates both laws and presents demonstrations. B/W (EBF) S. C.

4019. BALANCED AND UNBALANCED FORCES (3 reels, 30 Min.) Principles of composition of forces presented and demonstrated. B/W (EBF) S. C.

4020. CONCURRENT FORCES (LABORATORY) (3 reels, 30 Min.) Measures magnitudes and directions of forces. Data recorded. B/W (EBF) S. C.

4021. RESOLUTION OF FORCES (3 reels, 30 Min.) Single forces applied to bodies are resolved into components. Principles are illustrated by experiments. B/W (EBF) S. C.

4022. RESOLUTION OF FORCES (LABORATORY) (3 reels, 30 Min.) Force components on small loaded car are measured and recorded for class use. B/W (EBF) S. C.

4023. ROTATIONAL EQUILIBRIUM (3 reels, 30 Min.) Applies sets of forces to a rigid body and establishes translational and rotational equilibrium. B/W (EBF) S. C.

4024. PARALLEL FORCES (LABORATORY) (3 reels, 30 Min.) Uses two beam balances and a set of weights to apply forces at different points along a meter stick. Measures forces and distances as a class participation experiment. B/W (EBF) S. C.

4025. CENTER OF MASS AND CENTER OF GRAVITY (3 reels, 30 Min.) Presents principles and demonstrations of center of mass and center of gravity in simple form. B/W (EBF) S. C.

4026. THE SIMPLE CRANE (LABORATORY) (3 reels, 30 Min.) Forces in the tension and compression of members of a crane are measured and recorded. B/W (EBF) S. C.

4027. EQUILIBRIUM OF RIGID BODIES (3 reels, 30 Min.) Treats and demonstrates forces and torques acting on rigid bodies in equilibrium. B/W (EBF) S. C.

4028. FRICTION (3 reels, 30 Min.) Treats and demonstrates principles of sliding and rolling friction under various experimental conditions. B/W (EBF) S. C.

4029. COEFFICIENT OF FRICTION (LABORATORY) (3 reels, 30 Min.) Provides measurement of sliding and rolling friction for several different materials and records data. B/W (EBF) S. C.

4030. STREAMLINING (3 reels, 30 Min.) Laminar flow and turbulent flow are treated and demonstrated with models. B/W (EBF) S. C.

4031. WORK AND ENERGY (3 reels, 30 Min.) Principles of work and energy are formulated and demonstrated by models. B/W (EBF) S. C.

4032. CENTER OF GRAVITY (LABORATORY) (3 reels, 30 Min.) Combinations of regular shaped bodies are balanced and then set into rotation. Data recorded for class use. B/W (EBF) S. C.

4033. ENERGY AND POWER (3 reels, 30 Min.) Principles of kinetic energy and power are treated and demonstrated by mechanical models. B/W (EBF) S. C.

4034. HORSEPOWER (LABORATORY) (3 reels, 30 Min.) The horsepower of an electric motor is measured. Class records data. B/W (EBF) S. C.

4035. CONSERVATION OF ENERGY (3 reels, 30 Min.) Energy conservation as applied to kinetic and potential energy explained with experimental demonstrations. B/W (EBF) S. C.

4036. CONSERVATION OF MOMENTUM (3 reels, 30 Min.) Principles of impact, force, impulse, and momentum are developed and demonstrated by experiments. B/W (EBF) S. C.

4037. ENERGY AND MOMENTUM (LABORATORY) (3 reels, 30 Min.) Forces involved in driving a nail into a block of wood are measured and recorded by class. B/W (EBF) S. C.

4038. LEVERS (3 reels, 30 Min.) Principles of first, second, and third class levers are given with several demonstrations for each. B/W (EBF) S. C.

4039. LEVERS (LABORATORY) (3 reels, 30 Min.) First, second, and third class levers are set up, and applied equilibrium forces are measured. B/W (EBF) S. C.

4040. ANATOMICAL MECHANICS (3 reels, 30 Min.) Principles of mechanics are applied to the human body. Working models are shown. B/W (EBF) S. C.

4041. MACHINES (3 reels, 30 Min.) Principles of levers, wheels, pulleys, gears, and combinations of same are explained and demonstrated. B/W (EBF) S. C.

4042. BALLISTICS (LABORATORY) (3 reels, 30 Min.) Impulses for various rifle bullets are measured, and muzzle velocities determined. Class observes and records data. B/W (EBF) S. C.

4043. CIRCULAR MOTION (3 reels, 30 Min.) Principles of rotation, centripetal, and centrifugal forces are presented and demonstrated by numerous experiments. B/W (EBF) S. C.

4044. CENTRIPETAL FORCE (LABORATORY) (3 reels, 30 Min.) Centripetal forces acting on rotating mass and measured with different speeds and compared with theory. B/W (EBF) S. C.

4045. DYNAMICS OF ROTATION (3 reels, 30 Min.) Angular acceleration of rigid bodies in rotation is visually demonstrated. B/W (EBF) S. C.

4046. CONSERVATION OF ANGULAR MOMENTUM (3 reels, 30 Min.) Internal changes within rotating bodies are applied to mechanical models demonstrating conservation laws. B/W (EBF) S. C.

4047. MOMENT OF INERTIA (LABORATORY) (3 reels, 30 Min.) Angular accelerations of several regularly shaped bodies are measured and their moments of inertia determined. B/W (EBF) S. C.

4048. ATOMIC THEORY OF MATTER (3 reels, 30 Min.) Atoms and molecules, as they exist in solids, liquids, and gases, are explained with models. B/W (EBF) S. C.

4049. SLIDE RULE (3 reels, 30 Min.) Teaches beginner by demonstration. B/W (EBF) S. C.

4050. ALGEBRA AND POWERS OF TEN (3 reels, 30 Min.) Explains simple algebraic equations and use of powers of ten with particular emphasis on their use in physics. B/W (EBF) S. C.

4051. TRIGONOMETRY (3 reels, 30 Min.) Introduces sine, cosine, and tangent functions applied to a right triangle. B/W (EBF) S. C.

4052. ELASTICITY (STRESS, STRAIN, YOUNG'S MODULUS) (3 reels, 30 Min.) The elasticity of solids, as defined by Hooke's Law and Young's Modulus, is introduced and explained. B/W (EBF) S. C.

4053. HOOKE'S LAW (LABORATORY) (3 reels, 30 Min.) Measurements of stretching of a wire are made, Hooke's Law is demonstrated, and Young's Modulus is determined. B/W (BBF) S. C.

4054. BENDING, TWISTING, AND BOUNCING (3 reels, 30 Min.) Elastic properties of solids and Hooke's Law are demonstrated by the bending of beams, twisting of rods, and the bouncing of solid spheres. B/W (BBF) S. C.

4055. PRESSURE IN A LIQUID (3 reels, 30 Min.) Pressure in a liquid, density of liquids, the concepts of pressure and density, as they pertain to water, are explained and demonstrated. B/W (BBF) S. C.

4056. PRESSURE IN LIQUIDS (LABORATORY) (3 reels, 30 Min.) Liquid pressure is measured at various depths in fresh water and comparisons are made. B/W (BBF) S. C.

4057. ARCHIMEDES' PRINCIPLE (3 reels, 30 Min.) Principles of buoyancy, as applied to floating and submerged objects, are explained and demonstrated. B/W (BBF) S. C.

4058. DENSITY AND WEIGHT DENSITY (LABORATORY) (3 reels, 30 Min.) Density and weight density of five solids are determined experimentally. B/W (BBF) S. C.

4059. SURFACE TENSION (3 reels, 30 Min.) The phenomenon of surface tension in liquids is explained and demonstrated by numerous experiments. B/W (BBF) S. C.

4060. THE ATMOSPHERE (3 reels, 30 Min.) The physical properties of the earth's atmosphere are discussed, atmospheric pressure is demonstrated and measured, and practical applications of the principles are shown. B/W (BBF) S. C.

4061. WEIGHING THE AIR (LABORATORY) (3 reels, 30 Min.) A volume of air is measured and weighed, and density of air is determined. B/W (BBF) S. C.

4062. FLUIDS IN MOTION (3 reels, 30 Min.) Torricelli's Theorem is explained. Fluid friction and viscosity, as applied to fluids in motion, are discussed and demonstrated. B/W (BBF) S. C.

FRICTION (LABORATORY) (3 reels, 30 Min.) The velocity head, friction head, and pressure head, as applied to water flowing through a pipe, are measured. B/W (EBF) S. C.

BERNOULLI'S PRINCIPLE (3 reels, 30 Min.) Many apparent paradoxes, as they apply to flight, the curve of a pitched ball, etc., are explained and demonstrated as illustrations of Bernoulli's Principle. B/W (EBF) S. C.

4065. VIBRATIONS AND WAVES (3 reels, 30 Min.) Period, frequency, and amplitude of vibration objects, as they pertain to wave motion in general, are introduced and demonstrated. B/W (EBF) S. C.

4066. THE PENDULUM (LABORATORY) (3 reels, 30 Min.) The periods of several simple pendulums are measured, and the acceleration due to gravity is calculated. B/W (EBF) S. C.

4067. TEMPERATURE AND EXPANSION (3 reels, 30 Min.) Various methods of measuring temperature are demonstrated by means of mercury thermometers, electrical resistance thermometers, and thermopiles. The thermal expansion of solids is demonstrated. B/W (EBF) S. C.

4068. THERMAL EXPANSION (LABORATORY) (3 reels, 30 Min.) The temperature of different metal rods is raised and the resulting expansion measured. B/W (EBF) S. C.

4069. HEAT CAPACITY AND CHANGE OF STATE (3 reels, 30 Min.) The concepts of specific heat, thermal capacity and their relation to changes from solids to liquid to gaseous states are discussed and demonstrated. B/W (EBF) S. C.

4070. HEAT TRANSFER (3 reels, 30 Min.) Heat transfer by conduction through solids and convection by liquids and gases is demonstrated. Color (EBF) S. C.

4071. SPECIFIC HEAT (LABORATORY) (3 reels, 30 Min.) Specific heat and thermal capacity of a metal are determined by calorimetry. B/W (EBF) S. C.

4072. RADIANT HEAT (3 reels, 30 Min.) Transfer of heat by radiation is demonstrated. Kirchhoff's radiation laws and Prevost's law of heat exchange are discussed. B/W (EBF) S. C.

4073. LATENT HEAT OF FUSION (Laboratory (3 reels, 30 min.). The heat required to melt a measured quantity of ice is determined by calorimetry. B/W EBF S. C.

4074. CHANGE OF STATE (3 reels, 30 min.). The effect of pressure on the melting point of ice, the absolute and relative humidity of the atmosphere, and the general effects of pressure on the melting and boiling points are demonstrated. B/W EBF S. C.

4075. REFRIGERATION AND GEYSERS (3 reels, 30 min.). The general principles of refrigeration are presented. Water simultaneously boiling and freezing at the same temperature is shown. An actual periodically spouting geyser demonstrates the effect of pressure on the boiling point of water. B/W EBF S. C.

4076. NEWTON'S LAW OF COOLING (Laboratory) (3 reels, 30 min.). Cooling curves of two cups are determined, under different initial and final conditions, as demonstration of Newton's Law of Cooling. B/W EBF S. C.

4077. HEAT ENERGY AND GAS LAWS (3 reels, 30 min.). Transformation of mechanical energy into heat, mechanical equivalent of heat, the general gas law, Boyle's Law, Charles' Law are explained. B/W EBF S. C.

4078. MECHANICAL EQUIVALENT OF HEAT (Laboratory) (3 reels, 30 min.). Mechanical energy is transformed into heat energy by means of a motor-driven drum, and the mechanical equivalent of heat is determined. B/W EBF S. C.

4079. LIQUID AIR (3 reels, 30 min.). Low temperatures are discussed, the liquification of air is explained, and the changes of physical properties of solid and liquids, cooled to liquid air temperatures, are demonstrated. B/W EBF S. C.

4080. HEAT ENGINES (3 reels, 30 min.). The principles of the steam engine, internal combustion engines, gas turbines, and rocket engines are demonstrated. B/W EBF S. C.

4081. BOYLE'S LAW (Laboratory) (3 reels, 30 min.). The pressures on a fixed mass of air at different volumes but at constant temperature, are measured, thereby demonstrating Boyle's Law. B/W EBF S. C.

4082. SOUND WAVES (3 reels, 30 min.). Experimental demonstrations of simple harmonic motion, transverse and longitudinal waves, pitch, frequency, and speed of sound are given. B/W EBF S. C.

4083. FREQUENCY OF TUNING FORK (Laboratory) (3 reels, 30 min.). Vibograph method is used to measure the frequency of a tuning fork. Class observes and records data. B/W EBF S. C.

4084. RESONANCE, BEATS AND DOPPLER EFFECT (3 reels, 30 min.). Experimental demonstrations of tuning forks in resonance, significance of beat notes, and explanation of Doppler effect given. B/W EBF S. C.

4085. VIBRATING STRINGS AND AIR COLUMNS (3 reels, 30 min.). Relations between frequency, velocity, wave length, amplitude, and wave motions as they apply to standing transverse waves explained. B/W EBF S. C.

4086. VIBRATING STRINGS (Laboratory) (3 reels, 30 min.) Standing waves on a vibrating string are measured in terms of frequency, wave length, and wave velocity. B/W EBF S. C.

4087. WIND AND PERCUSSION INSTRUMENTS (3 reels, 30 min.) Demonstrations of vibrating air columns, organ pipes, reed mouthpieces, xylophone, cars, bells, and cymbal plates. B/W EBF S. C.

4088. RESONATING AIR COLUMNS (Laboratory) (3 reels, 30 min.). Standing longitudinal waves produced in a vibrating air column are measured. B/W EBF S. C.

4089. SOUND ENERGY AND HEARING (3 reels, 30 min.). Demonstrations of sound energy, its relation to loudness, decibels, the inverse square law, and the human ear as a detector are given. B/W EBF S. C.

4090. THE SCIENCE OF THE MUSICAL SCALE (3 reels, 30 min.). Vibration frequencies of the diatonic, chromatic, and equal tempered scales are described along with chords, harmony, and dissonance. EBF B/W S. C.

4091. SPEED OF SOUND (Laboratory) (3 reels, 30 min.). Standing longitudinal waves in vibrating gas columns are measured, and speed of sound in air and other gases is determined. B/W EBF S. C.

4092. THE QUALITY OF MUSICAL SOUNDS (3 reels, 30 min.). Relationship between fundamentals and harmonics as they pertain to quality of musical instruments and the human voice is demonstrated. B/W EBF S. C.

4093. THE NATURE OF LIGHT (3 reels, 30 min.) Sources of light, straight line propagation, pin hole camera, and speed of light are explained and illustrated. B/W EBF S. C.

4094. LIGHT SOURCES AND ILLUMINATION (3 reels, 30 min.). Introduction to inverse square law. The principles of photometry as a means of determining intensity of light sources, luminance, and illuminance are presented. B/W EBF S. C.

4095. PHOTOMETRY (Laboratory) (3 reels, 30 min.). Intensities of a number of light sources are determined by using a photometer. B/W EBF S. C.

4096. REFLECTION FROM PLANE SURFACES (3 reels, 30 min.). The law of reflection, both internal and external, from glass as well as water surfaces, is demonstrated by a number of different experiments. B/W EBF S. C.

4097. REFLECTION FROM PLANE SURFACES (Laboratory) (3 reels, 30 min.). The law of reflection is demonstrated by means of objects and their images as reflected in a plane mirror. B/W EBF S. C.

4098. REFLECTION FROM CURVED SURFACES (3 reels, 30 min.). The image-forming properties of concave mirrors are demonstrated and the object-image formula is introduced. B/W EBF S. C.

4099. REFRACTION OF LIGHT (3 reels, 30 min.). Refraction of light at smooth glass and water surfaces is demonstrated. Snell's law is introduced. Deviation of light by prisms having different angles is demonstrated. B/W EBF S. C.

4100. INDEX OF REFRACTION (Laboratory) (3 reels, 30 min.). The Harti Disc is used to measure angles of incidence and corresponding angles of refraction for the purpose of verifying Snell's Law. B/W EBF S. C.

4101. LENSES (3 reels, 30 min.). The principles of converging and diverging lenses are introduced. The object image formula is demonstrated as well as conjugate foci, real and virtual images. B/W EBF S. C.

4102. STUDY OF LENSES (Laboratory) (3 reels, 30 min.). The focal lengths of several converging lenses are determined, and the object and image distances for several arrangements of lenses are measured. B/W EBF S. C.

4103. DISPERSION (3 reels, 30 min.). The total reflection of light and internal reflection at glass and water surfaces are introduced and demonstrated. Also, the dispersion of white light into its spectrum is illustrated. Color S. C.

4104. COLOR (3 reels, 30 min.). The principles of the additive method of color mixing are illustrated by colored lights, and the principles of subtractive color mixing are demonstrated by color pigments. Color EBF S. C.

4105. MAGNIFYING POWER OF A LENS (Laboratory) (3 reels, 30 min.). The images of small objects, as seen through lenses of short focal length, are measured. B/W EBF S. C.

4106. THE EYE AND OPTICAL INSTRUMENTS (3 reels, 30 min.) The lens systems of cameras, telescopes, microscopes are introduced. Optical defects of the nearsighted and farsighted eye, and means of correcting such defects, are explained and demonstrated. B/W EBF S. C.

4107. PRINCLIPLES OF THE MISROSCOPE (Laboratory) (3 reels, 30 min.). Magnif ed images of small objects, as seen by two lenses simulating a microscope, are measured. Focal lengths, object distances, and image distances are measured. B/W EBF S. C.

4108. DIFFRACTION AND INTERFERENCE (3 reels, 30 min.). The diffraction of light, around small objects by a double slit, and by a diffraction grating, is presented in detail, and in each case, is demonstrated by an experiment. B/W EBF S. C.

4109. POLARIZATION OF LIGHT (3 reels, 30 min.) Polarization of light by reflection, by double refraction in calcite, and by polaroid is introduced and demonstrated. B/W EBF S. C.

4110. RAINBOWS, BLUE SKIES AND RED SUNSETS (3 reels, 30 min.). Available in Color only. Principles of the primary and secondary rainbow are presented and demonstrated. Halos around the sun and moon are discussed. The blue sky and red sunset are explained and demonstrated by a single experiment. Color EBF S. C.

4111. ELECTRICITY AT REST (3 reels, 30 min.). Demonstration experiments of static electricity and forces between electrically charged bodies are given. Electroscopes and electrometers are demonstrated. B/W EBF S. C.

4112. COULOMB'S LAW -- ELECTROSTATICS (3 reels, 30 min.). Law of forces between electrical charges is discussed. Charging by induction and discharging by points are demonstrated. B/W EBF S. C.

4113. ELECTRICITY IN MOTION (3 reels, 30 min.). Principles of the voltaic cell, battery cells in general, the dry cell, and storage battery are presented with demonstrations. B/W EBF S. C.

4114. ELECTROMOTIVE FORCE OF A BATTERY CELL (Laboratory) (3 reels, 30 min.). The electromotive force of battery cells, composed of different electrolytes and electrodes is measured, B/W EBF S. C.

4115. OHM'S LAW Relation between voltage, current, and resistance is demonstrated and treated in detail. B/W EBF S. C.

4116. SERIES CIRCUITS (Laboratory) (3 reels, 30 min.). Ohm's law is applied to combinations of resistors connected in series. B/W EBF S. C.

4117 PARALLEL CIRCUITS Ohm's Law and Kirchhoff's Law are demonstrated by combinations of resistors connected in parallel. B/W EBF S. C.

4118. THE ELECTRIC FIELD AND POTENTIAL (3 reels, 30 min.). Definitions and the meanings of electrical potential, potential difference, electrical field, and intensity are explained and demonstrated. B/W EBF S. C.

4119. PARALLEL RESISTANCE (Laboratory) (3 reels, 30 min.). The current through, and potential differences across, resistors connected in parallel are measured. Ohm's Law and Kirchhoff's Law are applied. B/W EBF S. C.

4120. CAPACITANCE (3 reels, 30 min.). The principles of capacitance and the construction of fixed variable capacitors are presented and demonstrated. B/W EBF S. C.

4121. THE POTENTIAL DIVIDER (Laboratory (3 reels, 30 min.). Slide wire resistance is used to obtain variable voltages from a fixed source of electromotive force B/W EBF S. C.

4122. MAGNETISM (3 reels, 30 min.). Properties of bar and horseshoe magnets and the principles of magnetic induction are discussed and demonstrated. B.W EBF S. C.

4123. MAGNETIC FIELDS (3 reels, 30 min.). Magnetic Fields around permanent magnets and the earth as a magnet are described, mapped out, and demonstrated. B/W EBF S. C.

4124. WHEATSTONE BRIDGE (Laboratory) (3 reels, 30 min.). The electrical resistance of a number of different kinds and sizes of wire is determined. B/W EBF S. C.

4125. EFFECTS OF ELECTRIC CURRENTS (3 reels, 30 min.). The heating effects and magnetic effects of electric currents are explained and demonstrated. B/W EBF S. C.

4126. ELECTRICAL EQUIVALENT OF HEAT (Laboratory) (3 reels, 30 min.). Electric current and voltage supplied to a standard light bulb and the heat produced by the expended electrical energy are measured. From these the electrical equivalent of heat can be calculated. B/W EBF S. C.

4127. ELECTRIC MOTORS (3 reels, 30 min.). The principles by which a magnetic field, exerting a force on a current carrying wire, are studied and demonstrated. The principles are also applied to the ammeter and voltmeter. B/W EBF S. C.

4128. MAGNETIC INDUCTION (3 reels, 30 min.). Magnetic field, in and around current carrying wires, coils, solenoids, and electromagnets are described, and methods of calculation presented. B/W EBF S. C.

4129. A STUDY OF MOTORS (Laboratory) (3 reels, 30 min.). Principles of the electric motor are described and demonstrated by actually assembling a small laboratory electric motor which operates. B/W EBF S. C.

4130. INDUCED ELECTRIC CURRENTS (3 reels, 30 min.). The principles of induced electric currents, beginning with Michael Faraday's discovery, are presented and then applied to the design of an electric generator. Alternating current is discussed along with eddy currents and Lenz's Law. B/W EBF S. C.

4131. COULOMB'S LAW -- MAGNETISM (Laboratory) (3 reels, 30 min.). Specially designed magnets are used on a hibbert balance. From measured forces between magnets, the inverse square law for magnetic poles can be verified. B/W EBF S. C.

4132. TRANSFORMERS (3 reels, 30 min.). Principles of induction coils, closed and open core transformers, and the long distance transmission of electrical energy over power lines are discussed and demonstrated. B/W EBF S. C.

4133. ALTERNATING CURRENT THEORY (3 reels, 30 min.). The concepts of inductance, inductive reactance, and impedance are introduced as fundamental principles relating to alternating currents. Leviation is demonstrated with an operating levitator. B/W EBF S. C.

4134. TRANSFORMERS (Laboratory) (3 reels, 30 min.). Voltage measurements on the primary and secondary coils of a transformer are made. Coil combinations, involving step-up and step-down transformers, are used. B/W EBF S. C.

4135. DISCOVERY OF THE ELECTRON (3 reels, 30 min.). The general appearance of high voltage electrical discharges in partially evacuated tubes is demonstrated. Straight line propagation and momentum of cathode rays are demonstrated. B/W EBF S. C.

4136. ELECTRONIC CHARGE AND MASS (3 reels, 30 min.). The bending of cathode rays in an electric field and in a magnetic field is described and demonstrated. These experiments show that cathode rays are negatively charged particles. Millikan's oil drop experiment is described in some detail. B/W EBF S. C.

4137. THE ELEMENTS AND THEIR ISOTOPES (3 reels, 30 min.). Thomson's mass spectrograph and his discovery of neon isotopes are described. Isotopes and their relative abundance are discussed. B/W EBF S. C.

4138. ELECTRONIC CHARGE TO MASS RATIO (Laboratory) (3 reels, 30 min.). A beam of electrons, from an electron gun, is bent in a magnetic field, and measurements of orbit radius, accelerating voltage, magnetic field, and current are made. These are for the purpose of calculating e/m for electrons. B/W EBF S. C.

4139 LIGHT SOURCES AND THEIR SPECTRA (3 reels, 30 min.). The four general types of spectra are described and demonstrated. These are continuous emission, continuous absorption, line emission, and line absorption spectra. Color EBF S. C.

4140. WAVE LENGTHS OF SPECTRUM LINES (Laboratory) (3 reels, 30 min.). Using a diffraction grating the spectrum lines of mercury vapor and sodium vapor are measured. From the results the wave lengths can be calculated. B.W EBF S. C.

4141. X-RAYS (3 reels, 30 min.). The discovery of X-rays by Roentgen and the construction and principles of X-ray tubes are discussed. The principles by which X-ray photographs are made and demonstrated. B/W EBF S. C.

4142. RADIOACTIVITY (3 reels, 30 min.). The discovery of radioactivity by Becquerel, the ionization of alpha, beta, and gamma rays are discussed. The principles of the Wilson Cloud Chamber are explained and demonstrated. B/W EBF S. C.

4143. RADIOACTIVITY MEASUREMENTS (Laboratory) (3 reels, , 30 min.). The characteristic plateau curve for a Geiger-mueller counter is determined experimentally, and measurements are made on a counting rate meter to verify the inverse square law. B/W EBF S. C.

4144. ELECTROMAGNETIC WAVES (3 reels, 30 min.). The Leyden Jar and the discovery of oscillating circuits are described and demonstrated. Electrical resonance, the propagation of electromagnetic waves, and the principles of the Tesla Coil are described and demonstrated. B/W EBF S. C.

4145. VACUUM TUBES (3 reels, 30 min.). The historical development of wireless and radio from Marconi to the DeForest Audion is covered. B. W BBF S. C.

4146. CHARACTERISTICS OF VACUUM TUBES (Laboratory) (3 reels, 30 min.). Measurements of grid-voltage and plate current applied to the elements of a triode vacuum tube are made. From these double characteristic curves are to be plotted. B/W BBF S. C.

4147. OSCILLATORS, AMPLIFIERS AND RADIO (3 reels, 30 min.). Electrical circuits using triode vacuum tubes as amplifiers and as oscillators are described. Simple radio transmitter and principles of a loud speaker are treated. B/W BBF S. C.

4148. THE PHOTOELECTRIC EFFECT, (3 reels, 30 min.). The phenomenon of the emission of electrons from metals, by the action of light, is demonstrated, and the explanation through the Einstein photoelectric equation is presented. Transmission of sound over a light beam is demonstrated. B/W BBF S. C.

4149. ELECTROMAGNETIC WAVES (Laboratory) (3 reels, 30 min.). VHF electromagnetic wave lengths are shown by standing waves on a conductor. Wave length of microwaves is measured by reflection from a plane surface. B/W BBF S. C.

4150. RADAR AND TV (3 reels, 30 min.). The echo effect of microwaves is described, and the use of wave guides is explained. The principles of scanning and of the image orthicon, as used in television, are presented. B/W BBF S. C.

4151. GEIGER-MUELLER AND SCINTILLATION COUNTERS (Laboratory) (3 reels, 30 min.). The counting rate capabilities of these two counters are studied. The resolution time of the Geiger-Mueller counter is determined from counting rate measurements. B/W BBF S. C.

4152. THE BOHR ATOM (3 reels, 30 min.). The Rutherford scattering experiments of alpha particles by thin metal films are described, and then demonstrated by a mechanical model. The principles of the Bohr atom of hydrogen are given. BBF B/W S. C.

4153. ELECTRON SHELL STRUCTURE (3 reels, 30 min.). The principles of the Bohr atom are extended to the other elements of the periodic table. Numbers of electrons in the various shells are described. The principles of the Thomson shell model are demonstrated by using small magnets floating in water. B/W BBF S. C.

4154. PHOTON COLLISIONS AND ATOMIC WAVES (3 reels, 30 min.). The photoelectric effect and Compton effect are discussed and demonstrations of the particle aspects of photons. The DeBroglie waves, as they apply to the Davisson-Germer experiment, and the hydrogen model are presented as illustrations of wave aspects of atomic particles. B/W EBF S. C.

4155. ELECTRON OPTICS (3 reels, 30 min.). Reflection of electrons in a uniform electric field is compared with the refraction of light and Snell's Law. Electron lenses of various shapes and designs are discussed and then applied to an electron gun, the oscilloscope, the infrared telescope, and the electron microscope. EBF B/W S. C.

4156. NUCLEAR DISINTEGRATION (3 reels, 30 min.). Rutherford's discovery of induced nuclear disintegration, Chadwich's discovery of the neutron, Einstein's mass energy equation, and the relations among different form of atomic energy are described and illustrated. B/W EBF S. C.

4157. COSMIC RAYS (3 reels, 30 min.). A brief history of the early experiments in cosmic rays is given. This is followed by a discussion of the discovery of the positron, the prediction and observation of electron pair production, and a description of cosmic ray showers and the continuous Wilson Cloud Chamber. B/W EBF S. C.

4158. ATOMIC ACCELERATORS (3 reels, 30 min.). Begins with the Cockroft-Walton experiment, then describes the cyclotron, Van de Graaff generator, betatron, and linear accelerator. A working mechanical model of a cyclotron is demonstrated. B/W EBF S. C.

4159. RADIATION MEASUREMENTS (Laboratory) (3 reels, 30 min.). The absorption of penetrating radiation by matter is described. Measurements of the absorption of beta and gamma rays, by solids, are made by means of a Geiger-Mueller counter. B/W EBF S. C.

4160. TRANSMUTATION (3 reels, 30 min.). The distegration and transmutation of atomic nuclei, produced by high energy atomic particles from typical accelerators, are described. Neutron disintegration and the discovery of mesons are discussed. B/W EBF S. C.

4161. INSIDE THE NUCLEUS AND FISSION (3 reels, 30 min.). Binding forces between nucleons; the nuclear barrier and potential well model of nuclei; and the transuranic elements are described. A working mechanical model of a nuclear potential barrier is used to demonstrate nuclear capture of high energy particles. B/W EBF S. C.

4162. NUCLEAR ENERGY (3 reels, 30 Min.) Describes fusion of hydrogen nuclei as a source of solar energy, the chain reaction of uranium nuclei, and principles of critical mass relating to atomic bombs and nuclear power plants. The mouse-trap experiment is used to demonstrate a chain reaction and a block model to illustrate an atomic pile. B/W EBF S. C.

4199. MITOSIS (3 reels, 24.) This film illustrates the fundamental process of cell division in plant and animal life, and discusses the importance of the mitotic process to the growth and maintenance of an organism. Photomicrography shows the process of cell division actually taking place in a living cell. The effects of chemicals and radiation on dividing cells are demonstrated. Color EBF S. C.

4203. SOCIAL INSECTS: THE HONEYBEE (3 reels, 24 Min.) Shows that social insects, such as the honeybee, live in colonies and are divided into castes, each of which contributes to the life of the colony. Illustrates the particular adaptation of various castes to reproduction, population control, and food gathering, and shows the metamorphosis of a honeybee from egg to adult. How bees communicate is shown and explained. Color EBF J. S.

4218. THE DESERT (3 reels, 22 Min.) Illustrates the interrelationships between plants and animal life and the physical enviornment of the desert. The geographical locations of desert areas, their ecological conditions, the causes of their formation, and their aridity are shown. Describes the adaptive mechanisms of a wide diversity of plant and animal life to the hot, arid desert environment. Color EBF S. C.

4226. WHY DO WE STILL HAVE MOUNTAINS? (3 reels, 20 Min.) This film investigates one of the most fundamental concepts in geology -- the struggle between weathering and erosion and the deformation of the Earth's crust. Simple measurements show that erosion should long ago have reduced North America almost to sea level. The film explores this apparent paradox by looking at the very nature of mountains. Many natural scenes are included as well as some laboratory experiments. The film concludes with a look at careful bench-mark measurements over a 40-year period. These bench-marks prove that in certain places, uplift is occuring today at rates which could easily produce mountains in a geologically short time. Color EBF J. S. A.

4232. PHOTOSYNTHESIS (3 reels, 21 Min.) Explains how green plants transform light energy into food by the process of photosynthesis. Laboratory demonstrations are used to show how scientists study the process by which carbon dioxide and water - in the presence of light and chlorophyll - react to produce sugar and release oxygen. Color EBF S. C.

4233. WHAT IS A FISH? (3 reels, 22 Min.) Illustrates the major types of fishes. Shows the anatomy of a typical fish and demonstrates characteristic behavior patterns of various kinds of fishes. Underwater photography is used to reveal behavior patterns such as commensalism, spawning, predation and territoriality.
Color EBF S. C.

4234. THE SEA (3 reels, 26 Min.) This film illustrates the interrelationships between living things in the sea, their dependence on each other and on the conditions of the marine environment. Shows the diversity of free-swimming animals and illustrates basic concepts of marine ecology. Color EBF S. C.

4235. ANGIOSPERMS - THE FLOWERING PLANTS (3 reels, 21 Min.) Describes the structural and reproductive characteristics which distinguish angiosperms from other plants. Animation and time-lapse photography are used to trace the processes of pollination, formation of seeds and fruit, seed dispersal, and plant growth in angiosperms. Illustrates a wide variety of angiosperms and explains their importance to man. Color EBF S. C.

4237. THE BEACH - A RIVER OF SAND (3 reels, 20 Min.) This film discusses an oceanographic wonder. "Where does sand come from?" "Where does sand go?" An elementary analysis of currents produced by waves - and documented by underwater photography, experiments with beach models, and calculations of accumulation and depletion of sand produced by jetties - proves that most of the pronounced net movement of sand is usually along the shore. Thus, the beach is a moving river of sand. It exists between the land on one side and the breaking waves on the other.
Color EBF J. S. A.

4238. ROCKS THAT ORGINATE UNDERGROUND (3 reels, 23 Min.) This film explores a subject very close to the heart of geology, i.e., the origin of igneous, and metamorphic rocks. These rocks are formed inside the Earth's crust. Geological conditions inside the crust are reconstructed by the use of indirect evidence. Igneous and metamorphic rocks have common characteristics -- intergrown crystalline mineral grains. Requirements for growing this type of crystal are investigated and these requirements combined with observations from nature, form the basis for studying the conditinns which give birth to underground rocks.
Color EBF J. S. A.

4265. OUTBOARD FISHERMAN U.S.A. (27 Minutes)
How small, independent, commercial fishermen, using outboard motors, contribute to the national economy. Contains scenes from 10 areas in the United States and Alaska and shows the catching of 10 different species of fish and shellfish with various fishing techniques. Color
Deposited by - U. S. Department of the Interior

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EDUCATIONAL MEDIA CENTER LOOP FILM GUIDE

L-1. THE FROG: EXTERNAL ANATOMY (2' 42") Shows the external features of the grass frog, Rana pipiens, by using labeled arrows to indicate regions and structures. Color (EBF) J. S.

L-2. THE FROG: PITHING (2') Demonstrates in slow-motion the accepted method for pithing a frog - both brain pith and spinal pith. The leopard or grass frog, Rana pipiens, is used. Color (EBF) J. S.

L-3. THE FROG: DIGESTIVE SYSTEM (4' 06") Illustrates an accepted method of making the initial incisions for dissection of the frog. Also identifies the specific organs of the frog's digestive system. Color (EBF) J. S.

L-4. THE FROG: BREATHING AND RESPIRATION (4' 12") Identifies the organs which contribute to external gas exchange in the grass frog, Rana pipiens. Animated drawings show the movement of air in the breathing process. Color (EBF) J. S.

L-5. THE FROG: REPRODUCTIVE AND URINARY SYSTEMS OF THE MALE (3' 12") Clearly shows and identifies internal organs associated with the urogenital system of the male. Color (EBF) J. S.

L-6. THE FROG: REPRODUCTIVE AND URINARY SYSTEMS OF THE FEMALE (3' 30") Illustrates, identifies, and locates the organs associated with female's excretory and reproductive systems. Also pictures the egg mass in a gravid female. Color (EBF) J. S.

L-7. THE FROG: REPRODUCTIVE AND URINARY SYSTEMS OF THE MALE AND FEMALE COMPARED (2' 12") A direct, side-by-side association is seen in the film to illustrate the similarity or dissimilarity between the reproductive and urinary systems of the male and female grass frog. Color (EBF) J. S.

L-8. THE FROG: ANATOMY OF THE CENTRAL NERVOUS SYSTEM (3' 12") Examines major features of the central nervous system in a preserved bullfrog, Rana catesbeiana. Includes brain, spinal cord, and obvious cranial nerves. Color (EBF) J. S.

L-9. THE FROG: CIRCULATION - THE ARTERIES (3' 30") Using a triple-injected preserved frog, film demonstrates main parts of the heart and major arterial vessels. Color (EBF) J. S.

L-10. THE FROG: CIRCULATION - THE VEINS (3') Major veins of the systemic circulation, injected with yellow latex, are dissected and pointed out. Veins of the Hepatic and Renal portal systems, injected with blue, are dissected and indicated. Color (EBF) J.S.

L-11. THE FROG: SIMPLE REFLEXES (3') Several stimuli and response situations are demonstrated in a living frog, Rana pipiens. Simple reflexes are demonstrated in a spinal frog using chemical, electrical, and mechanical stimuli. Color (EBF) J. S.

L-12. THE FROG: PREPARATION OF A SPINAL FROG (2' 42") The purpose of the film is to illustrate a generally accepted method for removing the forebrain and midbrain of a live frog, while leaving the hindbrain and spinal cord intact for demonstrating spinal reflexes. Color (EBF) J. S.

L-13. COLLECTING INSECTS: BUTTERFLY NET (3' 30") The techniques of catching insects with a net, locking the net, and transferring the insects to the killing jar, are shown in this film. Special emphasis is made of "locking the net," through the use of the slow motion camera. Color (EBF) J. S.

L-14. COLLECTING INSECTS: BY HAND (3' 30") Methods of finding and grasping insects by hand are illustrated in this film. Instruments used are the screw driver, pocket knife, forceps, and the aspirator. Emphasis is placed on where to look for insects. Color (EBF) J. S.

L-15. HANDLING DROSOPHILA - FRUIT FLY (4') Deals with the specific methods of culturing fruit flies, using the culture medium prepared earlier. Shows the techniques involved in separating the male and female fruit flies, their identification and separation into individual families within culture medium bottles. Color (EBF) J. S.

L-16. DROSOPHILA CULTURE MEDIUM PREPARATION - FRUIT FLY (4') Demonstrates the preparation of the medium used in culturing fruit flies. Explains the exact techniques and methods used in the preparation of the recipe. Color (EBF) J. S.

L-17. CROSSING DROSOPHILA - FRUIT FLY (4') Deals with the exact approach, step by step, in making the first cross between a Wild and Mutant strain of fruit fly. Color (EBF) J. S.

L-18. BLOOD SMEAR PREPARATION (4') Deals with the technique involved in obtaining a blood smear and the staining methods used in preparing this blood smear for microscopic observation. Shows the two methods of staining: Wright's stain technique and the Geimsa stain technique. Color (EBF) J. S.

L-19. CELL DIVISION - MITOSIS (CELL DIVISION) (2' 30") Film uses a generalized animal cell in the interphase resting stage to show the division of the nucleus which proceeds the fission of the whole cell. Color (EBF) J. S.

L-20. CIRCULATION - THE FLOW OF BLOOD (2' 55") Shows by means of animated diagrams, the flow of oxygenated blood from the heart through arteries to the capilaries; and the returning flow of deoxygenated blood through the veins to the heart. Color (EBF) J. S.

L-21. THE HEART IN ACTION (3' 15") Through the use of animated diagrams, the heart is shown as a pumping mechanism, functioning by means of muscular walled chambers and a series of valves. Color (EBF) J. S.

L-22. BREATHING MOVEMENTS (RESPIRATORY SYSTEM - BREATHING) (3' 15") Animated diagrams are used to show the two mechanisms of breathing movements - involving the diaphragm and the ribs - which increase and decrease the volume of air found in the lungs. Color (EBF) J. S.

L-23. VOLUME (3') By means of animation and live photography, the concept of volume as a three-dimensional measure is developed. Illustrates basic volumes used in chemical laboratory practice. Color (EBF) J. S.

L-24. DENSITY (3') Presents the actual derivation of the density of a solid together with the qualitative measure of liquid density. Defines density as weight/unit volume. Illustrates the relationship of the density of a solid to a liquid. Color (EBF) J. S.

L-25. BUOYANCY IN LIQUIDS (2' 30") Utilizing a specially designed laboratory apparatus, this film visually relates the loss of weight of the solid to the volume and weight of displaced liquid, and further defines the buoyant force as the weight of water displaced. Color (EBF) J. S.

L-26. BUOYANCY IN A GAS (2') Live photography, illustrating a controlled vacuum assembly in the laboratory, demonstrates qualitatively the effect of the buoyant force of air upon the weight of a gas volume. Color (EBF) J. S.

L-27. PHASE CHANGE (CHANGE OF STATE) (3' 30") By means of laboratory experimentation, the constant temperature of water at a phase change (melting and boiling) is illustrated. Demonstrates that by increasing the pressure during a phase change (boiling) the temperature of the boiling point of water can be raised. Color (EBF) J. S.

L-28. WEIGHING PROCEDURE (3' 35") Illustrates three types of balances used in the chemical laboratory, the platform balance, triple beam (centigram) balance, and the analytical balance. Defines a correct procedure for weighing, using a triple beam balance, accurate to 1/100th of a gram. Color (EBF) J. S.

L-29. WEIGHING - TRIPLE BEAM BALANCE (3' 30") Demonstrates the proper procedure for handling and weighing with the triple beam balance. Shows the actual weighing of a sample obtaining a weight, accurate to the nearest 1/100th of a gram. Color (EBF) J. S.

L-30. ANALYTICAL BALANCE - TARE WEIGHT DETERMINATION (3') Points out the correct technique of weighing with the analytical balance. Close-up photography demonstrates the actual process of weighing to obtain the tare weight of a container, accurate to the nearest 1/1000th of a gram. Color (EBF) J. S.

L-31. ANALYTICAL BALANCE - WEIGHING SAMPLE AND CONTAINER (3') Illustrates the technique of weighing a sample and container on the analytical balance. Concludes with the correct determination of final weight and the return of the weights to the weight case. Color (EBF) J. S.

L-32. FILTERING (3') The technique of preparing and using a filter, including the actual process of separating a solid residue from a liquid is demonstrated. Color (EBF) J. S.

L-33. DECANTING AND WASHING A RESIDUE (3') Shows the procedure for decanting a liquid, separating the liquid from a solid. The use of a wash bottle in purifying the residue is included in the technique. Color (EBF) J. S.

L-34. USING A BURETTE (3') Demonstrates the correct handling and use of a burette in measuring liquid volume. Graphically illustrates the correct method of reading a burette. Color (EBF) J. S.

L-35. TITRATING WITH PHENOLPHTHALEIN (3') Illustrates and defines the range of phenolphthalein as an indicator. Demonstrates the correct technique of titrating and reaching an end point using phenolphthalein. Color (EBF) J. S.

L-36. PLANE AND SPHERICAL WAVES: DIFFRACTION AT OBSTACLES (RIPPLE TANK-PLANE AND SPHERICAL WAVES) (2') Shows spherical progressive waves from a generator, plane progressive waves, and diffraction of plane waves around obstacles small and large with respect to the wave length. Color (EBF) J. S.

L-37. DIFFRACTION AT AN APERTURE (RIPPLE TANK-DIFFRACTION) (3' 25") Shows diffraction of plane waves at a small opening, diffraction by an aperture a few wave lengths wide, and diffraction at a large opening. Color (EBF) J. S.

L-38. REFLECTION AT PLANE AND CURVED SURFACES (RIPPLE TANK-REFLECTION) (3' 20") Shows reflection at plane and curved surfaces, and reflection at a concave surface. Color (EBF) J. S.

L-39. REFRACTION (RIPPLE TANK-REFRACTION) (3'40") After a shot of plane progressive waves, refraction at a plane interface, refraction by a triangular prism, and refraction by a lens is seen. Color (EBF) J. S.

L-40. INTERFERENCE (RIPPLE TANK-INTERFERENCE) (2' 05") Demonstrates interference and shows (through the use of diagrams) the pattern produced by combining the waves from two similar generators. Color (EBF) J. S.

L-41. CHAIN REACTION (NUCLEAR REACTIONS-CHAIN REACTIONS) CONTROLLED CHAIN REACTION (NUCLEAR REACTIONS-CONTROLLED CHAIN) (2' 35") Uses animated diagrams to show various stages of a chain reaction and of a controlled chain reaction around a Uranium 235 Nucleus Cluster. Color (EBF) J. S.

L-42. CRITICAL SIZE (NUCLEAR REACTIONS: CRITICAL SIZE) (2'10") Demonstrates the importance of critical mass in the creation of a nuclear reaction similar to that taking place in an atomic explosion. Color (EBF) J. S.

L-43. RUTHERFORD-ROYDS' IDENTIFICATION OF ALPHA PARTICLES IN HELIUM (RUTHERFORD AND ROYDS' IDENTIFICATION OF ALPHA PARTICLES) (3') Shows the Rutherford-Royds' apparatus, and how these scientists used it to prove conclusively that helium was formed by the accumulation of alpha particles. Color (EBF) J. S.

L-44. ASTON'S MASS SPECTOGRAPH (2' 20") Shows the original mass spectograph (and others) developed by the English scientist, Francis William Aston and follows the principles of its operation. Color (EBF) J. S.

L-45. THOMSON'S POSITIVE RAY PARABOLA (3' 25") Illustrates the principles of the apparatus used by the English physicist, J. J. Thomson, to investigate positive rays. Concludes with shots of actual parabolas obtained by Thomson. Color (EBF) J. S.

The following three cartridge films deal with the sine, cosine, and tangent. In each, a right angle trinagle within a circle with an acute angle at the center is animated so that the hypotenuse (radius) revolves about 360°. The triangle grows and diminishes within each quadrant.

Each film treats a separate function (sine, cosine, or tangent) of the angle at the center of the animated circle. An equivalent ration is isolated showing change in value and sine as each 90° is transversed.

L-91. SINE FUNCTION Color (EBF) J. S.

L-92. COSINE FUNCTION Color (EBF) J. S.

L-93. TANGENT Color (EBF) J. S.

ELEMENTARY LOOP FILMS

L-94. MATHEMATICAL SENTENCE Here a word sentence is compared with a number sentence. The word "is" is compared to an "equal" sign (=) and the words "is not" are shown to compare to the sign for "not equal" (≠). Color

L-95. FRACTIONS This loop defines fractions in terms of their position on the number line, and shows that only like fractions can be added or subracted. Color

L-96 BASE TEN Beach pebbles are put in one-to-one correspondence with cars that pass through the picture. Twenty-one pebbles are then manipulated to reveal the three major principles on which our common numeration system is based: (a) an additive system, (b) place value, and (c) base of ten. Color

L-97 SIGNED NUMBERS This loop illustrates the three sets of integers: positive integers, negative integers, and the integer zero. The negative integers are shown as being equal in value but opposite in "sign", by visualizing them as "negative" holes cut in a piece of fabric from which the equal but "positive" shape has been cut. Color

L-98 FRAMES Shows the algebraic method in which a frame represents an unknown quantity. A treasure chest represents the frame, and operations follow in which the chest, a numeral and a number of coins change places. Color

L-99 CLOSED CURVES Using a moving line segment as a visual device, this loop illustrates the relationship between "plane" and "region" - then distinguishes between concave and convex sets of points. Color

L-100 SET RELATIONS Using four sets of familiar objects and relating them to a fifth set of "apples," the loop implies the logic governing the pattern of deductive proof through which mathematics is developed. Various mathematical sets can replace the sets of objects in each case. Color

L-101 INFINITY A chocolate bar (symbolizing "one thing" or the numberal "1") is consecutively halved and shared among an infinite number of boys, to show that there is an infinite number of fractions that add up to "one." It implies that the set of points on any line segment is an infinite set. Color

L-102 DRILL TEAM Five animated soldiers maneuver through all the number groupings that add up to 2,3,4, and 5. As the soldiers march, the numerals animate to correspond with the number of soldiers. The loop illustrates the relationship of number and numeral. Color

L-103 SET GAME Cut-out "star" and "triangle" shapes move in obedience to laws of set theory within changing Venn diagram circles. By observing the changing relationships of color and shape, the student should discover the rules that justify each operation. Color

L-104 COUNTING A primitive method c counting without num is illustrated by a shepherd who counts sheep with the aid of a board containing the same number of holes as there are sheep. When he counts palm trees this way, he discovers his counting board was in fact a "base six." The loop implies that the "base" selected for computing purposes is predicated on the nature of the task to be performed. Color

L-105 DIRECTED NUMBERS This loop shows what a number line is and demonstrates how it can be used to define signed numbers, and to clarify the nature of addition and subtraction. Color

L-106 INEQUALITIES This loop emphasizes the logic of the "greater than" and "less than" symbols. As one group of pebbles changes from equality to "greater than," the equal sign must spread in the direction of the greater number in order to encompass it. As pebbles are removed, the visual evidence shows that zero is less than one. The loop implies the structure of a number line. Color

L-107 SYSTEM OF TWOS This loop illustrates a method of counting using only two numerals, "1" and "0." The importance of place value is emphasized as an asterisk moves from place to place in binary counting, in phase with conventional arabic numerals. As the loop develops, the asterisks become binary numerals and the conventional numerals are dispensed with. Color

L-108 PYTHAGORAS A right-angle triangle, having a hypotenuse of constant length, rotates about a fixed point while the line segments forming the other two sides shorten and lengthen in opposite phases. Squares are added to the three sides and their changing relationships are observed. The action is stopped and the squares animate to show that the square on the hypotenuse is equal to the sum of the squares on the other two sides. Color

L-109 DRY MOUNTING (Press)

L-110 DRY MOUNTING (Hand Iron)

L-111 DRY MOUNTING (Permanent Rubber Cement Mounting)

L-112 LAMINATING

L-113 CLOTH MOUNTING (Roll)

L-114 LETTERING: WRICOPRINT

L-115 WRICO SIGNMAKER

L-116 LEROY 500 & SMALLER Color

L-117 LETTERING - LEROY 700 AND LARGER COLOR

L-118 TRANSPARENCIES: DIAZO PROCESS COLOR

L-119 TRANSPARENCIES: HEAT PROCESS COLOR

L-120 35mm FILMSTRIP PROJECTOR COLOR

L-121 SPECIFIC PROJECTORS - GRAFLEX MODEL 815 Part 1 COLOR

L-122 SPECIFIC PROJECTORS - GRAFLEX MODEL 815 Part 2

L-123 WHAT HAPPENS WHEN LIGHTS ARE CONNECTED IN A PARALLEL CIRCUIT? Color

L-124 WHAT HAPPENS WHEN LIGHTS ARE CONNECTED IN A SERIES CIRCUIT? COLOR

L-125 WHAT IS MAGNETISM? COLOR

L-126 MOST SOLIDS MELT COLOR

L-127 HEAT EXPANDS METALS COLOR

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L-130 LONGITUDE COLOR

L-131 THE PANAMA CANAL COLOR

L-132 THE DAIRY COLOR

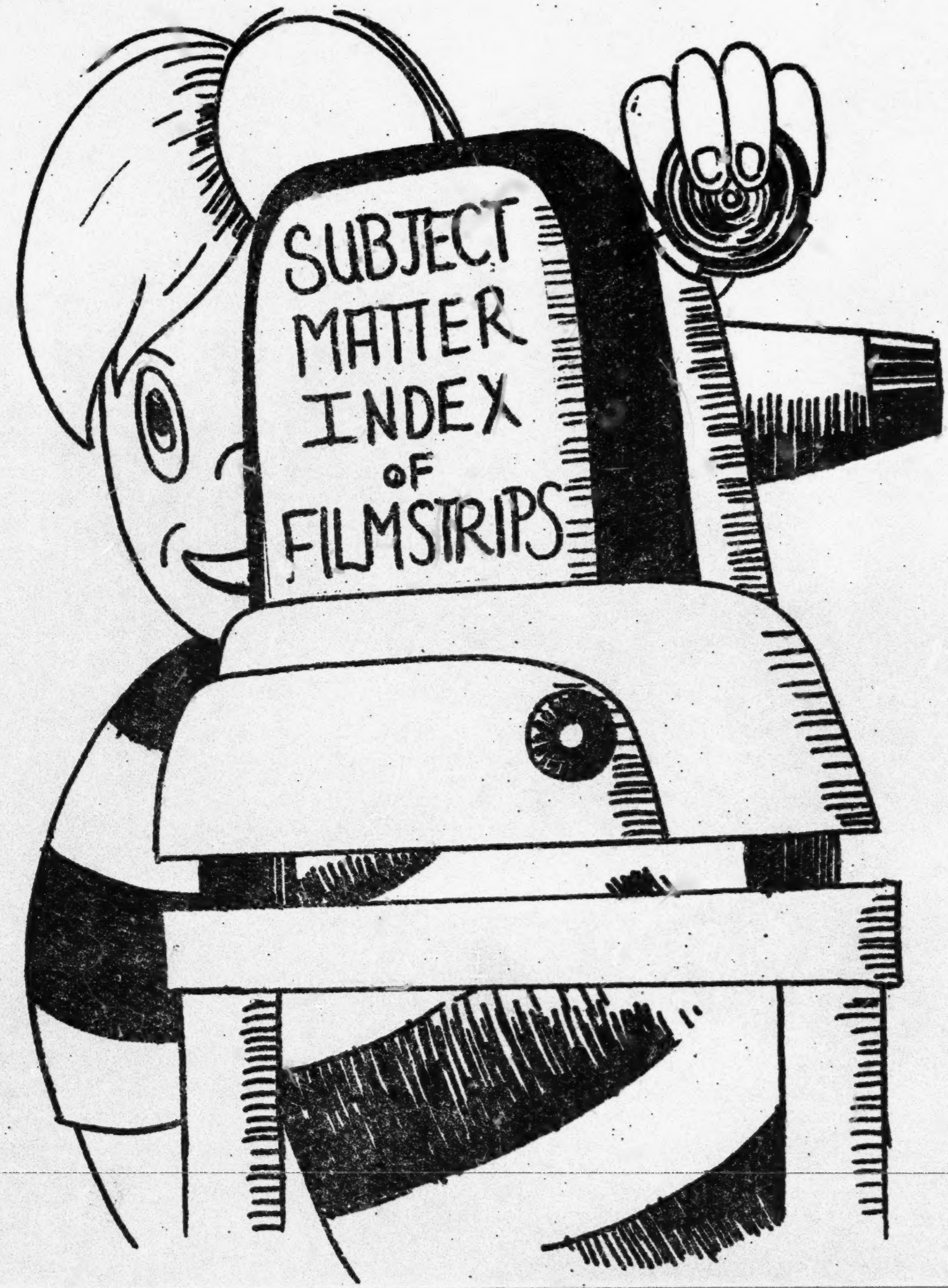
L-133 PARIS COLOR

L-134 THE AIRPORT COLOR

L-135 LONDON COLOR

L-136 WHY DO SOME FUELS START TO BURN SOONER THAN OTHERS? COLOR

L-137 HISTORIC ROME COLOR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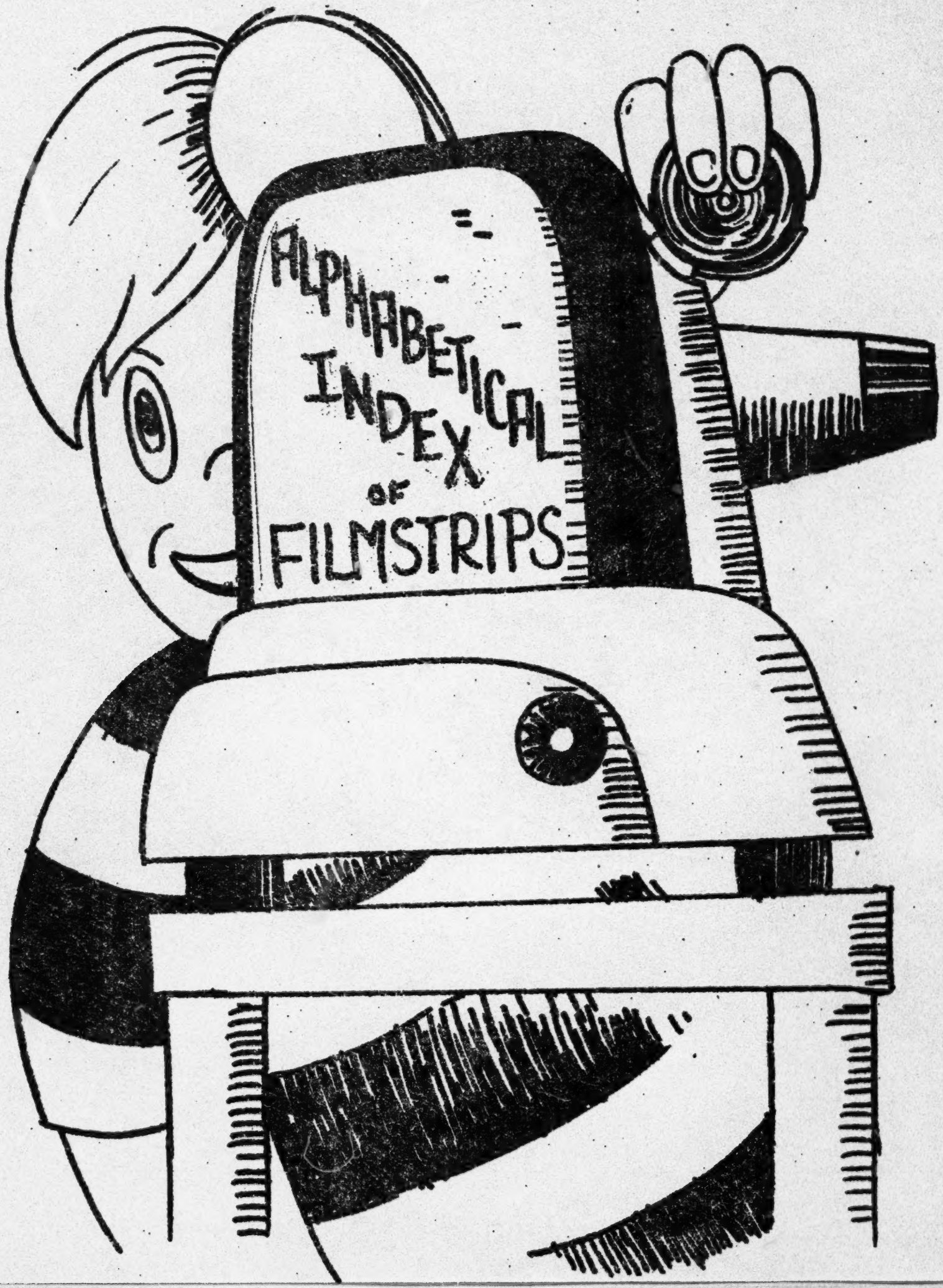
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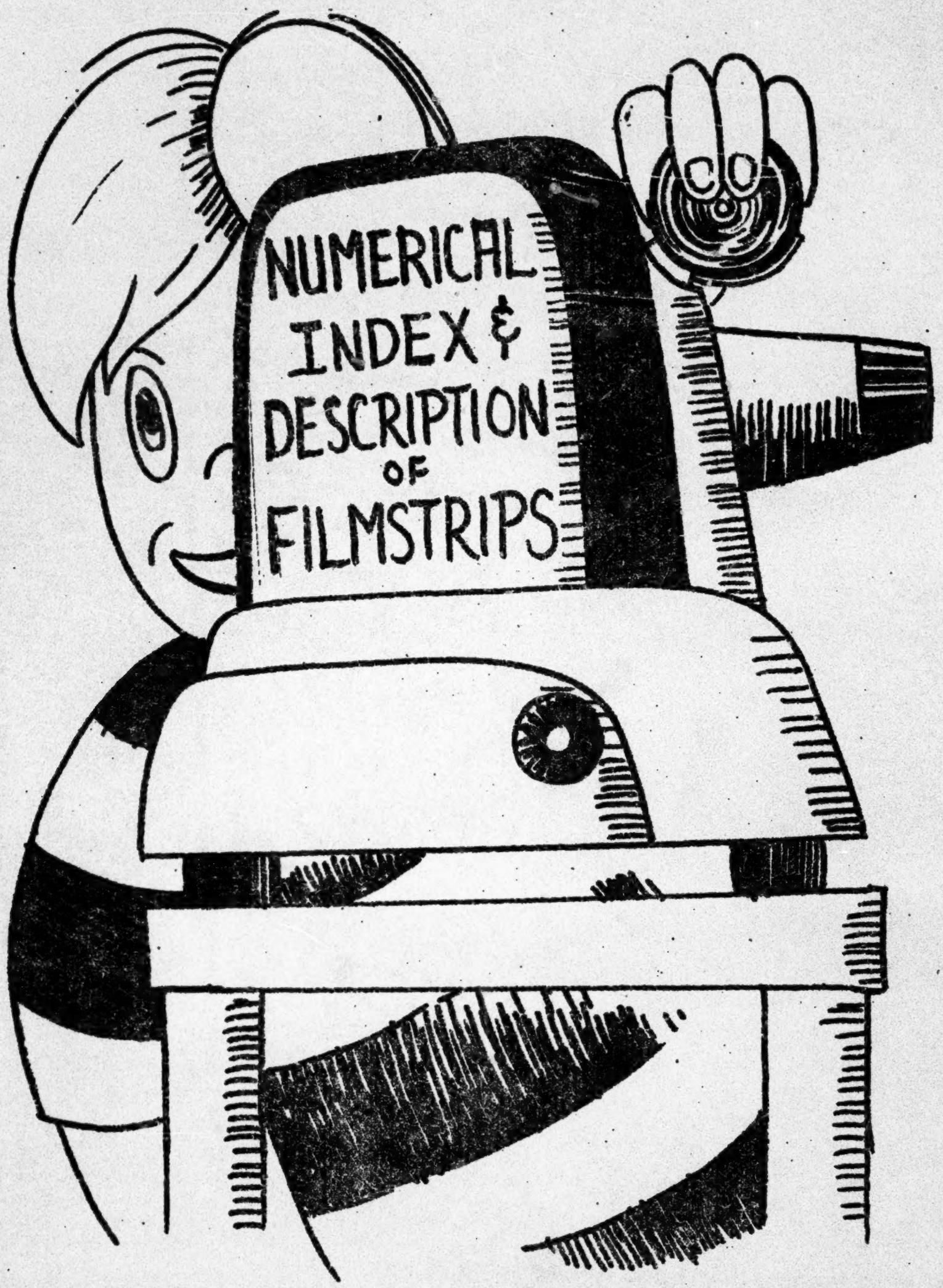

NUMERICAL
INDEX &
DESCRIPTION
OF
FILMSTRIPS

F-1. CLASSIFICATION OF LIVING FISH (Color) (J - S)
Each of the 135 color photographs (most of them of living fish) is captioned with a common name, approximate size of the mature fish, primary range of the species, and relative information about the fish's habits and habitats. The pictures are arranged in taxonomic order according to the way scientists believe the fish evolved. Three classes of fish included are the Agnatha (lampreys), the Chondrichthyes (sharks and rays), and the Osteichthyes (bony fish). (Filmstrips average 47 projection frames each.)

A. Primitive Cartilage Fish
B. Primitive Bony Fish
C. Representative Soft-Finned and Spiny-Finned Fish

F-2. CLASSIFICATION OF LIVING BIRDS (Color) (J - S)
The series provides a comprehensive selection of bird pictures in full, natural color, representing all major families. The filmstrips acquaint students with the basic external characteristics by which birds can be recognized and outlines the taxonomic system which ornithologists use in the classification of birds. A major reference source, useful to individual students as well as to teachers in classroom screenings. (Filmstrips average 47 projection frames each.)

A. Flightless Birds and Primitive Water Birds
B. Birds of Prey; and Game, Marsh, and Shore Birds
C. Some Birds of Field and Forest
D. Some Representative Perching Birds
E. Some Representative New World Songbirds

F-3. CLASSIFICATION OF LIVING MAMMALS (Color) (J - S)
In order to prepare this series of six color filmstrips, photographs were acquired from sources around the world .... ranging from the foxes and seals of the Arctic to the lemurs of Madagascar, and from tiny Bornean tree shrews to the elephants of India and Africa. The pictures have been arranged and classified according to the most modern system of mammalian taxonomy. The pictures have been supplemented by photographs of special museum models that clearly explain how the various lines of mammals have evolved. Text frames develop the principal points of classification, and individual picture captions provide important information about each mammal shown. The result is an excellent source of information for the understanding of the classification of mammals. (These filmstrips average 37 projection frames each.)

A. Primitive Mammals
B. Insectivores, Bats, and Whales
C. Primates
D. Rabbits and Rodents
B. Carnivores
F. Hoofed Animals

F-4. CLASSIFICATION OF INVERTEBRATE ANIMALS (EXCEPT INSECTS) (J - S) A unique series, carefully researched and [illegible] classification of all major invertebrate animals, except insects. (For insects, see Orders of Insects, Series No. 9340.) Pictures are complete with generally accepted common names, scientific names, and pertinent natural [illegible] The filmstrip How Animals are Classified explains and illustrates the taxonomist's use of binomial nomenclature in naming animals. Hundreds of color photographs, mostly of living animals, have been carefully assembled and organized to provide significant concepts of modern biological knowledge. (Filmstrips average 49 projection frames each.)

A. How Animals are Classified
B. The Protozoa
C. Sponges, Coelenterates, Ctenophores
D. The Flatworms
E. Roundworms and Some Minor Phyla of Animals
F. Snails and Slugs
G. Chitons, Tooth Shells, Clams, and Octopuses
H. The Segmented Worms
I. The Crustaceans
J. Arachnids, Centipedes, and Millipedes
K. Sea Stars and Their Relatives

F-5. THE INSECTS (Color) (J - S)
This filmstrip exploration of the insect world provides rare opportunity for classroom observation of the origins and structural characteristics of insects and their environmental struggle. Detailed photographic studies of honeybee colonies at work offer insight into social insects and their functions within colonies. Rare close-up studies of the stages of metamorphosis offer an outstanding learning experience in life cycles from egg to adult. Here is a graphic explanation of how insects carry disease germs and how some harmful insects are controlled. From photographs showing the development of the cotton boll weevil larva to a magnified view of the dragonfly's compound eye, this excellent filmstrip series achieves clarity and precision in its comprehensive presentation of basic biology material. (Filmstrips average 50 projection frames each.)

A. What is an Insect?
B. The Life Cycles of Insects
C. Insects That Live in Societies
D. Insects: Harmful and Useful

F-6. ORDERS OF INSECTS (color) (J - S)
Arranged in taxonomic order, dorsal and side view color photographs present comprehensive, pictorial classification profiles of all the major and some minor orders of insects. Captions identify most of the specimens by their common names as well as their scientific family names. (Filmstrips average 45 projection frames each.)

A. Some "Primitive" Insects
B. Grasshoppers and Their Relatives
C. Ants, Bees, and Wasps
D. Bugs and Their Relatives
E. Moths and Butterflies
F. Beetles
G. Flies and Mosquitoes
H. Termites and Some Minor Orders of Insects

F-7. CLASSIFICATION OF PLANTS (Color) (J - S)
From superb color photographs of giant Sequoia trees to electron photomicrographs of virus particles, the visuals in these filmstrips clarify various aspects of plant classification in a vital, interesting way. Modern photographic techniques are combined with the work of professional artists. The use of the latest system of plant taxonomy ensures authenticity. Captions make narration script or teaching guide unnecessary, and each filmstrip concludes with a list of suggestions for further discussions and research. Collaborators: William T. Doyle, Ph.D., and Howard J. Arnott, Ph.D., Northwestern University. (Filmstrips average 50 projection frames each.)

A. How Plants Are Classified
B. Bacteria
C. Fungi and Slime Molds
D. Algae
E. Ferns and Fern-Allies
F. Bryophytes
G. Gymnosperms
H. Monocotyledons
I. Dicotyledons

F-8. CLASSIFICATION OF LIVING AMPHIBIANS AND REPTILES (Color) (J-S)
Illustrates common representatives of major groups of amphibians and reptiles and shows the taxonomic system which scientists use to classify these animals. A common name, the primary range, some natural history, and aids to identification are provided for each of the animals shown. The filmstrips are so organized that they can be integrated into many different teaching plans. (Filmstrips average 44 projection frames each.)

A. Amphibians
B. Turtles
C. Crocodilians and Lizards
D. Snakes

F-9. THE HUMAN BODY (B/W) (J - H - A)
How do nerve impulses control our breathing? How do muscles help in the circulation of the blood? What really happens when sound waves enter the ear? What is the tonus reflex? These lucid visual presentations of the functioning of the human body answer these and many other related questions by means of a variety of techniques including real life photographs, labeled diagrams, drawings, and microphotographs. The series makes an outstanding contribution in clarifying body functions and structure for the beginning student in areas of biology, science, health, and physiology. At certain points in each filmstrip, review questions precede further exploration of the subject. Photographs of actual laboratory work help young people gain insight into the world of the working physiologist through the discovery process of learning. Each filmstrip closes with simple experiments students can do themselves. (Filmstrips average 65 projection frames each.)

A. The Heart and Circulation
B. Digestion of Foods
C. Foods and Nutrition
D. The Eyes and Their Care
E. The Teeth
F. Care of the Feet
G. Body Defenses against Disease
H. Reproduction among Mammals
I. Control of Body Temperature
J. Nervous System
K. Work of the Kidneys
L. Heredity
M. Mechanisms of Breathing
N. Ears and Hearing
O. Posture and Exercise
P. Endocrine Glands

F-16. PLANT LIFE (Color) (J - H)
EBF producers spent three years exploiting every facet of the medium of color photography to make this unique learning contribution to botanical aspects of the advanced biology curriculm. The entire world of plants, from algae to tree, is probed in great depth and sensivitity by the camera, bringing the wonder of the field trip experience into the science classroom. Versatile photography techniques reange from microphotography of yeasts in bud, successive magnification studies of root tip structure, macrophotography of clover root nodules. The field trip extends to biomes around the world with marine studies of the green draperies of sea lettuce, the glassy patterns of diatoms, woodland floor closeups of rare puffballs and earth stars, and still life portraits of the nuts, berries, drupes, and pomes. The classroom visits urban parks and ocean floor; the botanical research laboratory and greenhouse conservatory; farm fields and flower garden in an orderly process of observing plant classification, and the growth, structure and function of plant parts. Carefully drawn color diagrams support plant flower photography in describing the reproduction concepts of pollination, fertilization, embryo formation, and seed germination. (Filmstrips average 51 projection frames each.) (Continued)

F-16. PLANT LIFE (Continued)

A. The Plant Kingdom
B. Life Cycle of a Plant
C. Roots of Plants
D. Stems of Plants
E. Leaves of Plants
F. Flowers and Fruits

F-17. THE VANISHING PRAIRIE - WALT DISNEY (Color) (J-H-A)
"What is the use of the predator in nature's scheme?" This question typifies the learning experience offered by this series of filmstrips on the vast American grasslands. While buffalo and prairie dog are given strong emphasis pictorically, the great skill required by the predator to overcome the seemingly helpless prey is stressed throught approximately 300 visuals in natural color. Disney's camera makes a unique study of the prairie dog with patient photography of cutaway cross-section of a rodent's burrows. Picture sequences tell dramatic stroies of the birth of the prairie dog, co-existence with the burrowing owl, and dramatic encounters with rattlesnake, badger, and falcon. Great inland seas of grass are described visually with changes of storm, snow, fire. There is conservation instruction in the buffalo extinction story, and rare views of trumpeter swan with eggs, then cygnets in nest. (Filmstrips average 50 projection frames each.)

A. The American Prairie
B. The American Buffalo
C. Prairie Dogs
D. Mountain Lion, The
E. Coyotes and Other Prairie Animals
F. Birds of the Prairie

F-20. SCIENCE AND NATURAL RESOURCES (Color) (J - H)
This is a highly imaginative approach to learning about the many vital problems created by modern engineering inventiveness and the population explosion. The filmstrip visuals provoke classroom exploration of ways in which more people may find more food and housing, good air to breathe, and space in which to grow. Can chemistry supply all our demands? Is there any limit to what biologists can do to increase the food supply? Can we plan cities better and control the sprawling suburbs, or must the green land go? Illustrating provocative questions such as these by clever drawings and real-life photographs, this filmstrip series strikes at the roots of man's existence in an increasingly complex age. The series will compel the thoughful attention of the high school science or social studies class and provide meaningful insights into new areas of discovery. (Filmstrips average 34 projection frames each.)

A. Can the Biologist Meet the Demand?
B. Can the Chemist Renew the Supply?
C. Can the Physicist-Engineer Strike a Balance?

F-21. USING NATURAL RESOURCES (Color) (J)
This filmstrip series is designed to help students, through discussion and evaluation, to comprehend the nature of the environment in which they live. The series should help students become aware that the bounty of the earth is not endless and that science can help through the discovery of substitutes, but that there are no substitutes for water, space, and pure air. A teacher's manual accompanies the series. (Filmstrips average 34 projection frames each.)

A. The Demand
B. The Supply
C. Balancing the Supply and Demand

F-22. SOIL CONSERVATION (J - H - A)
This filmstrip series is an absorbing examination of the pressing problems of soil conservation that clearly explains what soil is, how it is formed, how it is used and misused, how it can be made more productive. It also correlates with junior and senior high school science, agriculture, geography, social studies; and with adult study programs. (Filmstrips average 60 projection frames each.)

A. How Long Will It Last?
B. How Soil Is Formed
C. Plant Life and the Soil
D. Water and the Soil
E. Animal Life and the Soil
F. Minerals in the Soil
G. How Man Has Used the Soil
H. How Man Conserves the Soil

F-23. NATURAL RESOURCES AND YOU (Color) (J - H)
The Conservation Foundation uses the clever medium of paper puppetooning to trigger juvenile interest in the world's natural resources and what they mean to all of us. The filmstrip visuals of charming paper people are motivational in story line, with captions which ask questions and a carefllly written text which develope complex conservation concepts. The teacher's manual accompanying the series will help the class probe further into such basic problems as utilizing the earth's energy, feeding an exploding population, increasing soil fertility, and conserving water resources. (Filmstrips average 34 projection frames each.)

A. What We Need
B. Where We Find It.
C. How We Get It.

F-24. THE EARTH AND ITS NEIGHBORS IN SPACE (Color) (J)
The relationship of the familiar to the vastness of space is the story line this series uses to ignite young minds with the need to know more. The narrative takes real children to the figurative house next door - the moon, and then to their heavenly neighborhood "among the planets." They explore the solar heating and lighting system of the "earthly home" and then to journey far away to the distant "cities of the stars." How earth's gravity pulls like rubber bands, why we don't see stars in the daytime, how the sun's atomic furnace works, how a comet gets its tail, and how all stars are suns are science concepts skillfully diagrammed on film. The series opening - a well drawn story of man's earliest celestial experience in legend and history - tells the difference between astrology and astronomy. (Filmstrips average 48 projection frames each.)

A. Astronomy Through the Ages
B. Our Earth
C. The Moon
D. The Sun
E. The Solar System
F. The Stars

F-25. SCANNING THE UNIVERSE (J - H - C)
Features the giant telescopes at Mount Wilson and Palomar as a means of astronomic study through telephotographs made at these famous observatories. The remarkable B/W visuals (all color in The Universe in Color) demonstrate the orientation of earth to planetary, solar, and galaxial systems. Treatment of celestial phenomena leads the student to an understanding of the universe and further study of specific area. (Filmstrips average 33 projection frames each.)

A. The Mount Wilson and Palomar Telescopes
B. Exploring the Moon
C. Planets and Comets
D. Exploring the Sun
E. The Milky Way and Other Galaxies
F. Nebulae
G. The Universe in Color (Color)

F-26. THE EARTH AND ITS WONDERS (Color) (J - H)
Why is a river "young" or "mature"? What makes a volcano? How do changes in temperature tear down rock? This visual treatment of such basic geological questions combines clarity with simplicity in presenting the action of minerals in groundwater, the working of an artesian well, the processes of faulting and folding in building mountains, or the formation of a glacier. Through effective color diagrams and drawings, young people will gain a new awareness of the nature of the surface of the earth, slowly but ceaselessly changing as a consequence of erosion, land-sinking and up-thrusting, shifting sands, and the freezing and thawing of water. (Filmstrips average 50 projection frames each.) (Continued)

F-26. THE EARTH AND ITS WONDERS (Continued)

A. The Story of Rivers
B. The Story of Underground Water
C. The Story of the Air
D. The Story of Mountains
E. The Story of Ice and Glaciers
F. The Story of Volcanoes

F.30. SPACE AND THE ATOM - WALT DISNEY (Color) (J - H)
A collection of science visuals in three topical areas: space exploration, the history of aviation, and an introduction to atomic science. Each may play an exciting role in stimulating young minds to inquire further into these advanced areas of 20th century science. The study of man's historic desire to fly through air and on into space is filmstrip treatment of one of the finest educational motion pictures Disney has produced. The material on atomic energy was designed by the animators and narrators with great comprehension and accuracy and includes a chronological history of atomic scientists and discoveries to date. (Filmstrips average 49 projection frames each.)

A. Man Becomes an Astronomer
B. Man and the Moon
C. Man Learns to Fly
D. Man In Flight
E. Man In Space
F. Flight into Space
G. Flight around the Moon
H. Flight to Mars
I. Man Discovers the Atom
J. Our Friend the Atom

F-31. THE ATOM: MAN'S SERVANT (Color) (J - H)
An animated atom with orbiting electrons and meteoric tail of radiation is the key symbol throughout more than 275 filmstrip frames which describe the principles of atomic energy. Brilliant diagrams, action photography, and generous text carry the student inductively from basic atomic anatomy, through the unstable radioisotopes and their restless quest for stability, to ways man is harnessing their enormous release of energy. Each filmstrip in the series builds upon the previous one with a continuous review of the structure and properties of the atom. The atom's structure is compared to a tiny solar system and its power to the "Philosopher's Stone" of the ancient alchemist whose dream was to change one element into another. One filmstrip focuses on the great fuel power released by the fission of atoms. It also describes four classes of atomic power reactors and compares atomic energy with that of the earth's dwindling supplies of "fossil fuels." The last three filmstrips consider, in diagrammed and photographic detail, the exciting detective and measuring tasks that the energetic radiosotopes are accomplishing today, in agriculture, industry, medicine, and every field of science research. (Filmstrips average 46 projection frames each.) (Continued)

F-31. THE ATOM: MAN'S SERVANT (Continued)

A. Introducing Atomic Energy
B. Harnessing the Atom
C. Radiosotopes: Natural and Man-made
D. Radiation and Its Practical Uses
E. Measuring With Radiation
F. The Atomic Detective

F-32. EXPERIMENTS IN CHEMISTRY (Color) (J - H)

This series provides clear, concise visual experiments of the laboratory techniques involved in performing some of the key experiments in beginning chemistry courses. The thrity filmstrips show how to do an experiment, including handling equipment and materials; the data to record and how to record them; the calculations to be made; and a series of basic questions to consider as a result of the experiment. The series has been produced in the spirit of the philosophy of the CHEM Study program. It examines basic areas experimentally and qualitatively, offering major assistance to students who ask when they enter the laboratory, "What are we supposed to do?" These visual experiences are equally useful for group or individual viewing. (The Filmstrips average 30 projection frames each.)

A. Introduction to the Chemistry Laboratory - Part I
B. Introduction to the Chemistry Laboratory - Part II
C. Measurement in Chemistry
D. Experiments with Subatomic Particles
E. The Size of Molecules
F. Crystallization
G. Chemical Reactions
H. Energy of Reactions
I. Boyle's Law
J. Charles' Law
K. Molar Volume of Gas
L. Determination of a Formula
M. Ionization
N. Acids and Bases
O. pH
P. Hydrolysis
Q. Equivalent Weight
R. Titration
S. Reaction Rates
T. Equilibrium
U. Oxidation - Reduction Reactions
V. Oxidation - Reduction Titration
W. Electrochemistry
X. Chemistry of Columns I and II
Y. Chemistry of the Halogens
Z. Chemistry of Sulfur
AA. Chemistry of Sulfuric Acid
BB. Chemistry of Boron and Aluminum
CC. Chemistry of Iron
DD. Qualitative Analysis

F-34. PREHISTORIC LIFE (Color) (J - H)
Modern dog tracks imprinted on yesterday's wet clay bank create one filmstrip frame. Topic of the next: monstrous dinosaur tracks left 200 million years ago in clay now turned to shale. Visuals like these show young people how to read the earth's history in the fascinating stories to be found in fossilized stone. The class takes a filmstrip trip to museum and laboratory to study evolution from invertebrates all the way to the mammoth. They see baby Protaceratops emerge from an 8-inch egg shell, how Eohippus gained hooves to become a horse, and how today's possum hasn't changed in 70 million years. In a trip to the field, science students learn that transition of fossil bones from mountain-side to museum is rough bulldozing labor, coupled with delicate prehistoric detective work. Complex terms and time cycles of Paleontology are carefully spelled out and charted with diagram and text. (Filmstrips average 55 projection frames each.)

A. Discovering Fossils
B. The Story Fossils Tell
C. The Coming of Reptiles
D. The Rise of the Dinosaurs
E. Triumph of the Dinosaurs
F. Age of Mammals

F-35. AUDUBON'S BIRDS OF AMERICA (Color) (J - H - A)
EBF makes a truly unique contribution to ornithologists, artists, and teachers with this handsome collection of 264 Audubon prints reproduced on filmstrip from museum original prints. Here is the incredible grace of bird on wing that Audubon described with his paint brush during 19 years of recording American wildlife. To create this insturctional series, the producer added text and captions describing migration, nesting, or feeding habits of each bird, its colorful character and ecological value. Audubon's observations of over a hundred years ago are placed in today's perspective with a running narrative of environmental change. How fence posts, telephone wires, and back yard gardens affect bird habits today is shown with seasonal color photos spaced between drawings of species. The first filmstrip uses Audubon's own autobiographical material to sketch a history of birds and animal life in 19th century America.

The great artist's own words are frequently employed as picture captions. (Filmstrips average 55 projection frames each.)

A. John James Audubon
B. Birds of the Countryside
C. Birds of Forest and Woodland
D. Birds of Villages and Towns
E. Birds of the Gardens
F. Birds of Sea and Shore

F-37. THE AFRICAN LION - Walt Disney (Color) (J - H - A)
The ecology of the grassy savannah of central Africa, in the shadow of Kilimanjaro and Victoria Falls, projects into the classroom with handsome color photography, drawings, and topographical maps. Balance of nature is dramatically described with close-up habitat studies of the contest between meat-eater, grass-eater, and scavenger, all pitted against the African environmental limitations of water and vegetation. Survival patterns of species are defined with dramatic photography: secretary bird versus snake, vulture versus zebra, locust invasion versus impala herd. A sequence showing rhinoceros trapped to die in a mud-hole gives a graphic explanation to children of how fossils are created. (Filmstrips average 48 projection frames each.)

A. King of Beasts
B. The King's Realm
C. Life and Death on the African Plain
D. Larger Animals of Africa
E. Antelopes and Smaller African Animals
F. Elephants in Africa

F-38. THE ARCTIC WILDERNESS - Walt Disney (Color) (J - H - A)
The abundant life of the Northland in tundra and subarctic zones is explored by the eloquent Disney color camera in a visual demonstration of animal adaptation to harsh environment. Among rare and remarkable photo sequences captured on film: the suicidal march of the lemmings in the classic description of natural species population control; a dramatic treetop contest between wolverine and nesting female osprey; and the family portrait of a pair of wolves. The series offers vivid descriptions of protective colorations, migration patterns, selective adaptations. Arresting color frames of Arctic birds, both migratory and resident, are included with rare views of nesting, feeding, and flight. (Filmstrips average 50 projection frames each.)

A. The Northland
B. Rodents of the Northland
C. Marine Mammals of the Northland
D. Arctic Foxes and Wolves
E. Wolverines and Weasels of the Northland
F. Birds of the Northland

F-39. THE LIVING DESERT - Walt Disney (Color) (J - H - A)
In this study of preservation of the species on the North American desert, science teachers will find dramatic projection of most of the ecological concepts of an environment where adaptation to lack of water is equated with survival. Some concepts explored at length: evolution and geology of the desert; protective animal colorations; metabolic survival mechanisms of desert animals. Photographs include exceptionally beautiful studies of reptiles, a predator contest between hawk and sidewinder, and the unique species relationship between tarantula and pepsis wasp in a dramatic death duel. The production crew visisted the desert in the post-rainy season to record the blooming beauty and low-moisture vitality of desert plants. (Filmstrips average 48 projection frames each.) (Continued)

F-39. THE LIVING DESERT (Continued)

A. The Great American Desert
B. Survival in the Desert
C. Mammals of the Desert
D. Reptiles of the Desert
E. Small Creatures of the Desert
F. Plant Life of the Desert

F-40. CONSERVING OUR NATURAL RESOURCES (Color) (J - H - A)

The filmstrip, "Saving Our Soil", opens with a graphic photograph of an irrigation ditch channeling clear blue water into furrows of a vegetable field. It offers a quick visual definition of conservation of one of six natural resources explored by the probing filmstrip camera. Other concepts explained: how an ear of corn needs a barrel of water to grow; how soil turns into flood, and mud, and dust; how forest fires destroy life; how uranium and plastics may replace the non-renewable energy of coal. When the camera finishes its observations of reforestration, contour plowing, erosion gully, and farm pond, the filmstrip artist takes over to digram abstract ideas and factual details.

The city child, as well as his rural friends, will feel the impact of this graphic story of our national loss and its restoration. Even the teacher will be motivated by the appealing lists of "Things to do" about conservation. (Filmstrips average 45 projection frames each.)

A. What is Conservation?
B. Saving Our Soil
C. Enough Water for Everyone
D. Improving Our Grassland
E. Using Our Forests Wisely
F. Giving Our Wildlife a Chance
G. Using Our Minerals Wisely

F-41. THIS IS YOU - Walt Disney (Color) (J)

Concepts of health and physiology come into the classroom with real learning impact via the charm and humor of Walt Disney's animations. Mr. Jiminy Cricket, Disney's clever juvenile salesman, uses all the visual devices of the cartoon medium to explain, "Remember, good health doesn't just happen, it has to be helped and planned!" He points out that the "You, Inc." factory needs good raw materials and constant maintenance to produce effectively. Young people identify their own body structure and functions by effective animated comparisons with a factory, an automobile, machines, and with other animals. While these Disney learning analogies are deceptively simple, the filmstrip series offers a degree of humorous sophistication that appeals to a wide age level. And Mr. Cricket leads the way in learning health rules by frequently dipping into books and the encyclopedia for facts. (Filmstrips average 50 projection frames each.)

1. (Continued)

F-41. THIS IS YOU (Continued)

A. You the Human Being
B. You and Your Five Senses
C. You and Your Eyes
D. You and Your Ears
E. Your Senses of Smell and Taste
F. Your Sense of Touch
G. You and Your Food
H. You the Living Machine

F-88. ATOMIC AND MOLECULAR MODELS (Color) (J - H)

Here is admirable utilization of the filmstrip technique to introduce the fundamentals of nuclear physics. Photographs of models are supplemented by effective diagrams in visually defining such concepts as ionic size, relative shapes, and sizes of simple covalent molecules, molecular symmetry, and relative electronegativity of atoms. A superb visual treatment of crystals is achieved in Packing of Atoms in Crystals, where the end view of 300 pieces of glass tubing strikingly demonstrates the regularities and irregularities in crystal growth. Construction of Molecular Models provides detailed instructions for the building of models of more than thirty common substances, adding another dimension to the possibilities for classroom presentation.

It was described in The Journal of Chemical Education as a "beautifully executed" series designed by "a master, both of his subject and of its visualization." It is accompanied by a 64-page teacher"s guide and reading script. (Filmstrips average 32 projection frames each.)

A. Relative Sizes of Atoms
B. Relative Sizes of Ions
C. Sizes and Shapes of Molecules
D. Shapes and Properties of Molecules
E. Crystals and Their Deformations
F. Packing of Atoms in Crystals
G. Construction of Molecular Models

F-89. INTRODUCTION TO CHEMISTRY (J - H)

Using diagrams, structural formulae, and color photographs of laboratory experiments, this series extends from the classification of matter into liquids, solids, and gases to the behavior of covalently and ionically bound substances. Among the many basics explained through these visuals are the different forms of the hydrogen atom, the concept of the polar molecule, determination of atomic weight, and the weights and electric charges of the particles distributed within the atom. The series stands on its own for an introduction of basic concepts, but it is also designed to correlate with the filmed EBF chemistry course under the direction of Dr. John Baxter. (Filmstrips average 49 projection frames each.) (Continued)

F-89. INTRODUCTION TO CHEMISTRY (Continued)

A. Classification of Matter
B. Molecules, Atoms, and Simple Reactions
C. Atomic and Molecular Weights
D. The Mole Concept
E. The Simplest Formula of a Compound
F. The Composition of Atoms
G. Electron Arrangement and Chemical Bonds
H. Ionic and Covalent Bonds
I. Ionization and Dissociation in Solution

F-90. FORESTS OF TROPICAL AMERICA Walt Disney (Color) (J-H-A)
Disney's camera crews offer a unique contribution to the biology classroom with this ecological study of jungle life. The student experiences at close-up the intense curiosity in the wolly monkey's eyes - simulaneously learns about cebids and marmosets, the two distinctive monkey families of the New World. He sees projected on the screen the harpy eagle of Central America with a furry agouti rodent captured in heavy claws, and takes part in the balance of nature concept in the eternal Rainforest struggle for existence. There is teaching support of selective adaptation concepts in environments of treetop, shadowed forest floor, river bank mud. Some rare color stills: tanagers and grosbeaks among the orchids, the might bushmaster at home, an inquisitive meeting between jaguar cub and rat snake. (Filmstrips average 50 projection frames each.) (

A. Land of the Tropical Forests
B. Mammals of the Tropical Forests
C. Monkeys of the Tropical Forests
D. Cats of the Tropical Forests
E. Birds of the Tropical Forests
F. Reptiles and Amphibians of the Tropical Forests

F-91. GREAT NAMES IN BIOLOGY (Color) (J - H)
The great breakthroughs in the advance of biological science, and the men who made them, are probed in depth in this historical overview. The series looks back through three centuries, with an artist's imaginative brush, to draw highlights of six of the most important areas of life science discovery in man's history: in the 17th century, Harvey and Leeuwenhoek proving respectively the function of blood circulation, and the existence of the microscopic world of life; Linnaeus and Darwin spending lifetimes in the 18th and 19th centuries writing their respective great works, The System of Nature and The Origin of the Species; Louis Pasteur establishing microbiology without aid of a microscope; and in the same 19th century, the inquisitive monk, Gregor Mendel, formulating the principles of genetics in his monastery garden. The life of each man is unfolded by the filmstrip medium, revealing the personal drives, problems, and courageous struggle to genius in search of the truth. Today's biology student experiences here a dramatic perspective of the painstaking process of discovery by experiment and analysis. And he is led into detailed byways of important science concepts with the filmstrip study of other historical names who both influenced and supported the epoch-making discoveries of these six men. (Filmstrips average 50 projection frames each.) (Continued)

F-91 GREAT NAMES IN BIOLOGY (Continued)

A. William Harvey
B. Antony Van Leeuwenhock
C. Carolus Linnaeus
D. Charles Darwin
E. Louis Pasteur
F. Gregor Mendel

F-150 THROUGH THE LOOKING GLASS - Good Grooming

F-150 SIMPLE CAMERA, THE (A Kodak instruction Unit)

1a Pictures Unlimited
1b About Cameras
1c What about You?
2a Load Your Camera - There's enough natural light
2b Which Pictures are good pictures?
2c Take Good Pictures
3a Change The Direction of the Light
3b Control The Dark Side
3c Try Other Kinds of Light
4a Take Color Slides - What About Color Prints?
4b Evaluate Your First Color Slides
4c Things inside and outside your Camera

F-164 SPACE & SPACE TRAVEL

A. Conditions In Space
B. Space Rockets
C. Man's Preparation For Space Travel
D. Space Satellites
E. Space Stations
F. Exploring The Moon

F-173 SCIENCE AT WORK

A. Sound
B. Light
C. Electricity
D. Magnets
E. Chemical Change
F. Machines

F-181 WONDERS OF THE SKY

A. Man Studies The Sky
B. Our Sizzling Sun
C. Our Silvery Moon
D. The Milky Way
E. Sky Patterns
F. Life On Other Planets
G. Laws Of The Sky
H. The Earth In Space
I. Time, Space, and Energy

F-182 SCIENCE IN EVERYDAY LIFE

A. Airplanes And How They Fly
B. Air and Life
C. Soil And Its Uses
D. Machines for Daily Use
E. Light In Our Daily Lives
F. What Makes The Weather?
G. Water and Its Importance
H. The Stars In The Sky

F-193 NATIONAL TUBERCULOSIS ASSOCIATION

A. Keeping Well and Happy
B. The Long Adventure
C. TB Everybody's Problem
D. Crusade of the Christmas Seal

F-194 HEALTH HEROES SERIES
- A. Edward Livingston Trudeau and the Crusade Against T.B.
- B. Edward Jenner and the Story of Smallpox Vaccination
- C. Florence Nightengale and the Founding of Professional Nursing
- D. Walter Reed and the Conquest of Yellow Fever

F-195 HEALTH HEROES SERIES (2 complete sets)
- A. Koch
- B. Madame Curie
- C. Pasteur

F-196 PRIMARY HEALTH
- B. Keeping Clean
- D. Rest and Sleep
- E. Keeping Well
- F. Straight and Tall

F-197 GOOD HEALTH AND YOU
- A. Community Helpers For Health
- B. Right Clothes Help Health
- D. Exercise for Happy Living
- E. Right Foods Help Health
- F. Health and Eyes
- G. Right Habits Help Health
- H. Health and Exercise
- I. Community Helpers for Health
- J. Why Be Healthy

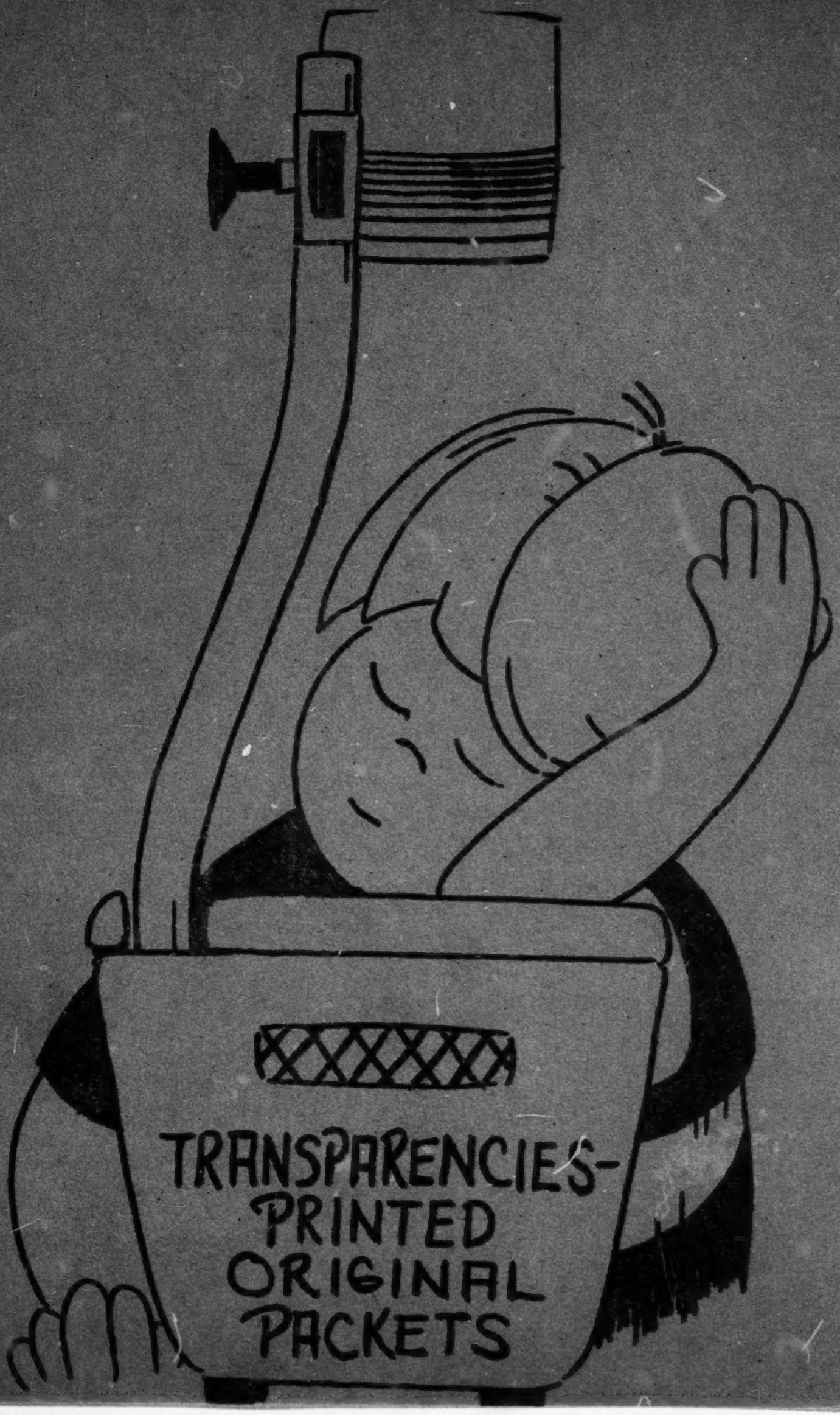
F-255 THE EYE OF SCIENCE
The Camera In Science Studies
Biology, Chemistry, Physics, Earth Science, and Nature Science

F-256 HOW STEEL IS MADE

F-258 SIMPLE MACHINES

F-259 BASIC NATURE STUDIES SERIES
- A. How To Recognize Birds
- B. How Birds are Fitted for Their Work
- C. How Insects Live and Grow
- D. How To Identify Moths, Butterflies
- E. Life Cycle of Monarch Butterfly
- F. Life of the Honeybee
- G. Frogs, Toads, and Turtles
- H. Snakes, and Lizards You Should Know
- I. Identifying Common Trees
- J. How Plants Grow and Reproduce

F-260 OUR HEALTH DEPARTMENT


TRANSPARENCIES-
PRINTED
ORIGINAL
PACKETS

ANTHROPOLOGY

Anthropology No. 1 -- "Prehistoric Man" - A comparison of the physical characteristics of early man with that of modern man and glimpses of early developments in his culture.

Anthropology No. 2 -- "Primitive Man, Part I" - A series of visuals emphasizing primitive man's basic needs and how these needs are satisfied under various environmental conditions.

Anthropology No. 3 -- "Primitive Man, Part II" - The basic ways to obtaining food are presented through a visit to many peoples around the world. Also shows the effect of environment on obtaining food.

Anthropology No. 4--"Primitive Man, Part III"--Ways of dress around the world stressing the effect of surroundings on the way man dresses.

Anthropology No. 5--"Primitive Man, Part IV"-- The way in which man provides shelter for himself in different parts of the world and the effec t of surroundings on determining man's housing.

Anthropology No. 6--"The Races of Mankind" -- Physical characteristics of the major races and how these traits aid them in adjusting to their environment.

ART

Art No. 1--"Points, Lines and Dimensions"--An initial aid in the teaching of basic art forms and effects.

AUDIO-VISUAL

Audio-Visual No. 1--"Slide Preparation and Presentation"--Illustrating methods of gathering, cataloging, and showing slides.

Audio-Visual No. 2--"Using the Overhead Projector"--Suggestions on how to get the most from the Visual Communications System.

BUSINESS

Business No. 1--"Bookkeeping and Accounting"--Various business, banking and accounting forms.

Business No. 2--"The Income Tax"--Outlining the U.S. taxing system.

Business No. 3--"Beginning Typing"--An introduction to the machine and its uses.

Business No. 4--"Typing Exercises"--Beginning with elementary exercises and progressing to the more complex.

CIVICS

Civics No. 1--"Lower Elementary Safety"--A clever and interesting way to teach children the rules of safety.

Civics No. 2--"Higher Elementary Safety"--Illustrates rules of safety in the playground, at the beach, at home, etc.

Civics No. 4--"The ABC's of Safety"--Rhy mes and pictures to set the stage for safety in the elementary grades.

Civics No. 5--"Driver Education"--Regulatory signs and typical intersections.

CONSERVATION

Conservation No. 1--"The Land That Supports Us"--This packet, designed for use in the elementary grades, features illustrations for use in teaching broad concepts in natural resources conservation.
Conservation No. 2--"Our Soil Resource"-This elementary level packet emphasizes information about the soil, the results of using soil improperly and principles involved in conserving it.
Conservation No. 3--"Our Water Resources"--The story of our water resources and man's management of them is illustrated for students in the elementary grades.

ENGLISH

English No. 1--"Outlining and Figures of Speech"--To help students to understand and define figures of speech.
English No. 2--"Nouns and Verbs"
English No. 3--"Adjectives and Adverbs"
English No. 4--"Prepositional Phrases"
English No. 5--"Dependent Clauses"
English No. 6--"Conjunctions"
English Packet No. 7--"Sentence Building"
English No. 8--"Basic Speech"--Reviews basic procudures in organizing, polishing, and presenting the speech.
English No. 9--"Library Science--The Dewey Decimal System"--An introduction to the Dewey Decimal System and card filing.
English No. 10--"Basic Reading, Part 1"--Designed to aid in remedial teaching to problem readers.
English No. 11--"Basic Reading Part II"
English No. 12--"An Introduction to Poetry"--Explains basic rhythm and measure.
English No. 13--"Elementary Punctuation, Part I"
English No. 14--"Elementary Punctuation, Part II"
English No. 15--"Possessives"
English No. 16--"Advanced Punctuation"
English No. 17--"Compound and Complex Sentences"
English No. 18--"Capitalization"
English No. 19--"Composition: Writing Effective Sentences, Part I"
English No. 20--"Composition: Using Transitions"
English No. 22--"Composition: Writing the Theme"

FOREIGN LANGUAGE

Foreign Language No. 1--"How to Translate Latin"--To help students follow a logical plan in the translation of Latin.
Foreign Language No. 2--"Spanish--Subject Pronouns"
Foreign Language No. 3--"Spanish--ER,IR and irregular Ending Verbs"
Foreign Language No. 4--"Vocabulary and Dialogue Situations, Part I" -- The first of two packets offering visuals helpful in the teaching of all Indo-European languages.

Foreign Language No. 5--"Vocabulary and Dialogue Situations Part II"
Foreign Language No. 6--"Spanish--Word and Number Games"
Foreign Language No. 7--"Spanish Vocabulary--Part I"
Foreign Language No. 8--"Spanish Vocabulary--Part II"
Foreign Language No. 9--"Spanish--Interrogatives"
Fpreign Language No. 10--"Spanish--Stem Changing and Reflexive verbs"
Foreign Language No. 11--"Spanish--Possessive and Limiting Adjectives"
Foreign Language No. 12--"Spanish--Personal Descriptive Adjectives Part I"
Foreign Language No. 13--"Spanish--Personal Descriptive Adjectives -- Part II"
Foreign Language No. 14--"All About Spanish Verbs"
Foreign Language No. 15--"Spanish: Basic Verbs--Present Tense Part I"
Foreign Language No. 16--"Spanish: Basic Verbs--Present Tense Part II"
Foreign Language No. 17--"Spanish: Basic Verbs--Present Tense Part III"
Foreign Language No. 18--"Spanish: Basic Verbs--Present Tense Part Iv"
Foreign Language No. 19--"Spanish: Basic Verbs Preterit Tense Part I"
Foreign Language No. 20--"Spanish" Basic Verbs Preterit Tense Part II"
Foreign Language No. 21--"Spanish: Basic Verbs Preterit Tense Part III"
Foreign Language No. 22--"Spanish: Basic Verbs Preterit Tense Part IV"
Foreign Language No. 23--"Spanish: Basic Verbs Preterit Tense Part V."
Foreign Language No. 24--"Spanish: Numerical, Geographical and Color Adjectives"

GEOGRAPHY

Geography No. 1--"Outline Maps of the U.S., Alabama through Missouri"
Geography No. 2--"Outline Maps of the U.S., Montana through Wyoming"
Geography No. 3--"Physical Geography"--Geographical terms and forms for the elementary level.
Geography No. 4--"Atlas--United States, Canada, and Western Europe." Includes river systems and waterways.
Geography No. 5--"Atlas--Eastern Europe and the Middle East"
Geography No. 6--"Atlas--The Far East and North Africa"
Geography No. 7--"Atlas--Central and South Africa"
Geography No. 8--"Atlas--Latin America and the North and South Polar Regions"

HISTORY

History No. 1--"The Medieval Era"--Illustrations to supplement an introductory study of this formative period in European civilization includes visuals depicting important social, political, economic and religious aspects of the age.
History No. 2--"Atlas of World History--Part I"
History No. 3--"Atlas of World History--Part II"
History No. 4--"Atlas of World History--Part III"
History No. 5--"Atlas of World History--Part IV"
History No. 6--"U.S. Area Maps; Geopolitical Features"--Showing the development of the country.
History No. 7--"Classical Greece"--Visual Aspects of Greek History covering C600-400 B.C.

HOME ECONOMICS

Home Economics No. 1--"Planning, Selecting, Serving and Eating Food"
Home Economics No. 2--"Period Furniture Designs"--Provides illustrations of historic and modern furniture design applicable to study units on interior decorating, furniture arrangement, etc.
Home Economics No. 3--"Home Styles"--Illustrations of styles in different eras and areas.
Home Economics No. 4--"Basic Sewing--Part I" The first of two packets for beginning sewing and clothing construction.
Home Economics No. 5--"Basic Sewing--Part II"--A continuation of the above packet giving more details and hints on clothing construction.
Home Economics No. 6--"Trimmings"--Shows how to make pom-poms, bows, and other decorative trimmings.
Home Economisc No. 7--"Basic Tailoring--Part I"--The first of two packets explaining the more difficult phases of tailoring.
Home Economics No. 8--"Basic Tailoring--Part II"--Further discussion of principles and types of tailoring.

INDUSTRIAL ARTS

Industrial Arts No. 1--"Lathe Work"--Beginning principles of the metal lathe.
Industrial Arts No. 2--"Hand Tools and Machines in the Wood Shop".
Industrial Arts No. 3--"Safety in the Shops"--Help make students aware of hazards and safety measures.
Industrial Arts No. 4--"Mechanical Drawing"--Geometric and orthographic drawings, dimensions, projections, etc.
Industrial Arts No. 5--"Basic Wiring"--Presentation of the fundamentals of everyday electricity.
Industrial Arts No. 7--"Leatherworking"--Shows in detail the tools and methods used in making leather goods.
Industrial Arts No. 6--"Metalworking"

MATHEMATICS

Mathematics No. 1--"Plane and Solid Figures"--Their classification, relationship and measure.
Mathematics No. 2--"Unions, Intersections of Lines and Planes"
Mathematics No. 3--"Measuring and Using the Circle"
Mathematics No. 4--"Lower Elementary Topics"--An aid in understanding basic arithmetic.
Mathematics No. 5--"Intermediate Topics"--Factors, multiples, composite numbers, prime numbers, etc.
Mathematics No. 6--"Topics in Algebra and Coordinate Geometry"
Mathematics No. 7--"Elementary Topics"--Fundamental operations, mental activities, tables of reference and problem solving.
Mathematics No. 8--"Fundamental Operations"--Exercises in addition, subtraction, multiplication, and division.
Mathematics No. 9--"Gude Geometric Shapes for 3-Dimensional Models". Contains geometric designs by Arthur J. Gude that can be cut, folded, and cemented together.
Mathematics No. 10--"Numeration Systems"--Outlines ancient and present systems of numbering.
Mathematics No. 11--"Sets and Sentences"--The language of math.
Mathematics No. 12--"Plots of Equations"--Contains geometric designs, graphs, conic sections and equations.
Mathematics No. 13--"Geometric Construction with Lines, Angles, Triangles."
Mathematics No. 14--"Geometric Construction with Circles and Polygons"
Mathematics No. 15--"Beginning Mathematics"--Topics for the primary grades: Recognition and understanding of number and numeral, cardinal and ordinal, and size relations.
Mathematics No. 16--"Preparing for Addition and Subtraction"--Combinations through tens.
Mathematics No. 17--"Preparing for Multiplication and Division"--Combinations through tens.
Mathematics No. 18--"Fractional Numbers"--Introduction to the fraction. Illustrates the part-whole relationship and makes comparisons of one part to another.
Mathematics No. 19.--"Introducing Geometric Figures"
Mathematics No. 20--"Number Bases On The Number Line"
Mathematics No. 21--"Addition and Multiplication"--Concepts for natural and rational numbers.
Mathematics No. 22--"Subtraction and Division"--Concepts for natural and rational numbers.
Mathematics No. 23--"Ordered Pairs"--Mathematical sentences involving two variables, graphs, and problem solving.
Mathematics No. 24--"Rate Pairs"--Mathematical sentences involving rate pairs, per cent, business arithmetic and problem solving.
Mathematics No. 25--"Natural Number System"
Mathematics No. 26--"Pythagorean Theorem"

MATHEMATICS

Mathematics No. 27--"Brain Teasers"
Mathematics No. 28--"Optical Illusions"--Illustrations that play with the eyes.
Mathematics No. 29--"The Slide Rule"--An introduction to the use of the C,D,A, and B Scales.
Mathematics No. 30--"The Abacus"
Mathematics No. 31--"Polar and Rectangular Coordinates --Part I"
Mathematics No. 32--"Polar and Rectangular Coordinates --Part II"
Mathematics No. 33--"3-Dimensional Drawings"
Mathematics No. 34--"Trigonometric Functions"
Mathematics No. 35--"Introduction to Probability"

MUSIC

Music No. 1--"Identification of Musical Instruments"
Music No. 2--"Families of Musical Instruments"
Music No. 3--"Music Notation and Other Exercises"
Music No. 4--"Assembly Singing"--Lyrics of songs suitable for group singing.
Music No. 5--"Basic Rhythm Patterns, Part I"
Music No. 6--"Basic Rhythm Patterns, Part II"
Music No. 7--"Complex Rhythm Patterns"--More advanced exercises in group teaching of music.

PHONICS

Phonics No. 1--"Initial Consonant Sounds B-L"
Phonics No. 2--"Initial Consonant Sounds M-Z"
Phonics No. 3--"Consonant Combinations and Review of Initial Consonant Sounds"
Phonics No. 4--"Review of Vowel Sounds"--Reviews sounds and combination letters.
Phonics No. 5--"Review of Vowel Sounds and Other Exercises"
Phonics No. 6--"Review of Vowel and Consonant Sounds and Compound Word Building"

PHYSICAL EDUCATION

Physical Education No. 1--"Wrestling: Reverses, Escapes, Breakdowns, Rides and Counters"
Physical Education No. 2--"Wrestling: Take Downs and Go Behinds"
Physical Education No. 3--"Trampoline: Body Positions and Exercises"
Physical Education No. 4--"Tumbling: Form, Sequence and Exercise"
Physical Education No. 5--"Forms in Track and Field"
Physical Education No. 6--"Swimming and Diving Sequences"
Physical Education No. 7--"Football, Basketball and Baseball"
Physical Education No. 8--"Basic Health--Head to Toe"

SCIENCE

Science No. 1 - "Electricity and Semiconductors" - Shows development of transistor.
Science No. 2 - "Periodicity of the Elements" - Various trends in physical properties of elements.
Science No. 3 - "Biology"
Science No. 4 - "General Science"
Science No. 5 - "Water, Air and Heat" - Basic natural laws for the elementary grades.
Science No. 6 - "The Story of Trees" - Shows the importance of wood products to our economy.
Science No. 16 - "Automotive Foundry"
Science No. 17 - "Automobile Design and Engineering"
Science No. 18 - "Automobile Assembly and Testing"
Science No. 19 - "The Automobile Engine"
Science No. 20 - "A History of Measurement"
Science No. 21 - "DNA-RNA, Structure and Replications" - An aid in teaching the chemical structure of deoxyribonucleic acid.
Science No. 22 - "The Moon" - An elementary level examination of our natural satellite.
Science No. 23 - "Identification of Hardwood Trees" - Showing winter twig, leaf, and fruit of important North American genera.
Science No. 24 - "Biology - Ecological Aspects"
Science No. 25 - "The Earth"
Science No. 26 - "Physics - Motion"
Science No. 27 - "Earth Science-Weather"
Science No. 28 - "Chemical Bonding"
Science No. 29 - "The Story of Flight"
Science No. 30 - "The Story of Steel"
Science No. 31 - "The Story of Rubber"
Science No. 32 - "The Story of Computers" - A pictorial presentation of computers and their abilities.
Science No. 33 - "The Story of Gas"
Science No. 34 - "Magnetism and Electro Magnetism"
Science No. 35 - "Combustion Engines"
Science No. 36 - "Geologic Functions" - Designed for Junior High level but can be adapted to elementary science courses.
Science No. 37 - "Rocks and Minerals"
Science No. 38 - "Heat - Its Measurement, Transfer and Effects"
Science No. 39 - "Study of Birds" - Designed to teach elementary students the parts of a bird, its habits and lodgings.
Science No. 40 - "Physics - Waves"
Science No. 41 - "Reflection of Light"
Science No. 42 - "Refraction of Light"

VOCATIONAL EDUCATION

Vocational Packet No. 1 - "Auto Body Repair" - Illustrates correct use of tools and techniques.
Vocational Packet No. 2 - "Acetylene Welding" - Equipment and techniques.
Vocational Packet No. 3 - "Arc Welding"
Vocational Packet No. 4 - "Auto Body Painting" - From preparation through the final steps.
Vocational Packet No. 5 - "Auto Testing" - "The Starting System"
Vocational Packet No. 6 - "Auto Testing" - "The Charging System"
Vocational Packet No. 7 - "Auto Testing" - "The Spark and Ignition"
Vocational Packet No. 8 - "Auto Testing" - "The Ignition System"
Vocational Packet No. 9 - "Auto Testing" - "The Fuel System, Tuning"
Vocational Packet No. 10 - "House Framing Part I" - Shows the staking out of house perimeters, construction techniques and general framing.
Vocational Packet No. 11 - "House Framing Part II"
Vocational Packet No. 12 - "Roof Framing" - Shows the basic construction techniques used in wood roof framing.
Vocational Packet No. 13 - "Cosmetology" - "Basic Hair Styling - Part I" Hair styling techniques and principles of design.
Vocational Packet No. 14 - Cosmetology - "Basic Hair Styling - Part II" Advanced hair styling practice and design.

SPECIAL PACKETS

Packet No. 1 - Electronic Masters
Packet No. 2 - Introduction to Electronic Devices
Packet No. 3 - Microwave Techniques and Components
Packet No. 4 - Electronic Circuit Analysis
Packet No. 5 - Fundamentals of Electricity
Packet No. 6 - Electronic Structure, Properties, and the Periodic Law
Packet No. 7 - Chemstudy - Part I
Packet No. 8 - Chemstudy - Part II
Packet No. 9 - Principles of Chemical Equilibrium
Packet No. 10 - Chemical Bonding and the Geometry of Molecules
Packet No. 11 - Acids, Bases and the Chemistry of the Covalent Bond
Packet No. 12 - Chemical Energy
Packet No. 13 - Health
The Human Reproduction Systems
Marriage and the Family: Responsibilities and Provileges
Conception, Prenatal Development, and Birth
The Family
Individual Health and Family Life
Professional Health Specialists
Health Information and Mass Media
Areas of Specialization in Health
The Health and Happiness of the Family
The Health Professions
Governmental Agencies and Health
Interpretation of Health Information

Packet No. 14 - Alphy's Show-and-Tell
Packet No. 15 - George Catlin's American Indians
Packet No. 16 - Overland Trails West

Packet No. 17 - An Introduction to i/t/a

Packet No. 18 - Supplementary Sets In Science - "Living Things"
Packet No. 19 - Supplementary Sets In Science "Motion"
Packet No. 20 - Supplementary Sets In Science - "Energy In Waves"
Packet No. 21 - Supplementary Sets In Science - "Space"

Packet No. 22 -"Shakespeare and Character" (Tape Included)
Packet No. 23 -"Shakespeare and Imagery" (Tape Included)
Packet No. 24 -"Art of Shakespeare" (Tape Included)

DIAZO MASTERS

Texas Agency Masters

Vol. 1 - English 8
Vol. 2 - English 11
Vol. 3 - Algebra
Vol. 4 - Geometry
Vol. 5 - Chemistry
Vol. 6 - Mathematics
Vol. 7 - Spanish I
Vol. 8 - Spanish II
Vol. 9 - World Geography
Vol. 10 - Earth Science

K & E Masters

Chemistry
Geography
U. S. History
Biology

READY MADE TRANSPARENCIES --

RMT 1 - Western Africa
RMT 2 - Northeastern Africa
RMT 3 - Central Africa
RMT 4 - Southern Africa
RMT 5 - Mexico
RMT 6 - Central America
RMT 7 - Canada

READY MADE TRANSPARENCIES -- continued

RMT	8	Indians - Clothing
	9	Average Rainfall of U. S.
RMT	10	Fish - Yellow Perch
	11	Machines: Lever
	12	Machines: Inclined Plane
	13	Machines: Wheel & Axle
	14	Machines: Pulley
	15	Weather: Cloud Formations
	16	Weather: Water Cycle
	17	Universe: Solar System
	18	Universe: Relative Sizes of Planets
	19	Universe: Revolution
	20	Universe: Northern Star System
	21	Universe: Southern Star System
	22	Energy: Fields of Force
	23	Energy: Dry Cell & Circuit
	24	Energy: Electric Bell
RMT	25	Fractions: Concept of Fractions
	26	Fractions: Comparison of Fractions
	27	Problem Solving: Concepts
	28	Problem Solving: Addition
	29	Problem Solving: Subtraction
	30	Problem Solving: Multiplication
	31	Problem Solving: Division
	32	Graphs: Bar Graphs
	33	Graphs: Line Graphs
	34	Graphs: Picto-Graphs
	35	Graph Base
	36	Place Valve: Whole Numbers
	37	Place Valve: Decimals
	38	Measurement: Liquid (2)
	39	Measurement: Linear
	40	Measurement: Weight
	41	Measurement: Dry Measure
	42	Per Cent: The Meaning of Per Cent (2)
	43	Calibrated Circle
	44	Time Zones
	45	Cray Fish, The
	46	Temperature Scale

READY MADE TRANSPARENCIES - - continued

RMT 47 Elementary Science Transparencies ASTRONOMY

Day and Night	Seasons
Moon	Solar System
Eclipses	Star Chart

RMT 48 Elementary Science Transparencies GEOLOGY

Volcano	Glaciation
Folded Mountains	Rock Cycle
Fault Mountains	Geologic Time

RMT 49 FLIGHT

Parts of an airplane
Forces of flight
The Turbojet Engine
Rocket Engines

RMT 50 SPACE PICTURES

Halley's Comet	The Orion Nebula
Comet Mrkos	The Crab Nebula
Surface of the Moon	The Ring Nebula
Full Moon	Stars of the Milky Way
First Quarter Phase	Spiral Galaxy, Side View
Solar Prominences	Whirlpool Galaxy
Total Solar Exlipse	Barred Spiral
The Pleiades	Andromeda Galaxy

RMT 51 MAP READING

Maps and Globes	Scale
Topography	Key and Index
Elevation	

RMT 52 EARTH SCIENCE

Volcanoes	Erosion and Sedimentation
Mountain Building	

RMT 53 PHONICS

The Alphabet